

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

UNITED THERAPEUTICS)
CORPORATION,)
)
Plaintiff)
) C.A. No. 23-975 (RGA) (SRF)
v.)
) REDACTED – PUBLIC VERSION
LIQUIDIA TECHNOLOGIES, INC.,)
)
Defendant.)

VOLUME 2 OF 2 OF
PROPOSED JOINT PRETRIAL ORDER

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EXHIBIT 5

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LIQUIDIA TECHNOLOGIES, INC.,)
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Pursuant to D. Del. L.R. 16.3(c)(5) and the schedule set forth in the governing Scheduling Order (*see* D.I. 45), Defendant Liquidia Technologies, Inc. (“Liquidia”) respectfully submits the following Statement of Issues of Law that Remain to Be Litigated, based on Liquidia’s current understanding of the claims of Plaintiff United Therapeutics Corporation (“UTC”).

By setting forth specific information, Liquidia does not intend to waive its right to prove information not specifically set forth herein. This Statement is not intended to be exhaustive, and, in addition to what is set out herein, Liquidia may prove any matters identified in its pleadings and discovery taken in this action to date. Liquidia’s identification of the issues of law that remain to be litigated is based, in part, on its understanding of the arguments that UTC is likely to make in attempting to establish infringement and to respond to Liquidia’s invalidity case, based upon the pleadings and discovery in the action to date. To the extent that UTC intends or attempts to introduce different or additional legal arguments, Liquidia reserves its right to contest those legal arguments, and to present any and all rebuttal evidence in response to those arguments without being bound by this summary of remaining legal issues. Moreover, nothing in this statement should be construed as Liquidia’s agreement or acquiescence to UTC’s Statement of Issues of Law that Remain to Be Litigated (Exhibit 4).

To the extent that Liquidia’s Statement of Contested Facts that Remain to Be Litigated (Exhibit 3) contains issues of law, those issues are incorporated herein by reference. Likewise, should the Court determine that any issue identified in this Statement as an issue of law is more appropriately considered an issue of fact, it should be treated as an issue of fact as if listed by Defendant in Exhibit 3. By including a fact herein, Liquidia does not assume the burden of proof or production with regard to that fact. Liquidia further reserves the right to revise this statement in light of the Court’s orders or rulings and in light of any amendments or revisions to UTC’s

statements of issues of law and/or fact remaining to be litigated.

I. CLAIM CONSTRUCTION

A. Issues

1. Defining a person of ordinary skill in the art (“POSA”) with respect to claims 1-11, 14-19 of the ’327 patent (collectively, “the ’327 patent Asserted Claims”).
2. Whether the additional limitations of dependent claims 2-10 and 17-19 are directed to intended results and thus have no patentable weight.
3. Whether dependent claims 9-10 require a statistically significant improvement of forced vital capacity, and whether the “at least 20 ml” of claim 10 must be a statistically significant improvement.

B. Legal Authority

4. Claim construction is a matter of law to be determined by the judge. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 384, 390 (1996). Claim terms are construed by giving the words of the claim the plain and ordinary meaning they would have had to a person of ordinary skill in the art (“POSA”) at the time of the invention, in view of the intrinsic record, which consists of the claims, specification, and file history. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313–14 (Fed. Cir. 2005); *see also Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) (“We cannot look at the ordinary meaning of the term . . . in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history.”) (citation omitted); *Eon Corp. IP Holdings v. Silver Springs Networks, Inc.*, 815 F.3d 1314, 1320 (Fed. Cir. 2016). To construe a claim, a court “look[s] first to the intrinsic evidence of record, examining the claim language itself, the specification, and the prosecution history.” *Janssen Pharmaceutica, N.V. v. Eon Labs. Mfg., Inc.*, 134 F. App’x 425, 428 (Fed. Cir. 2005). In evaluating the plain and ordinary meaning of a claim term or phrase, courts may also look to

extrinsic evidence, which “consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.” *Phillips*, 415 F.3d at 1317–19 (citations omitted).

5. “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Starhome GmbH v. AT&T Mobility LLC*, 743 F.3d 849, 856 (Fed. Cir. 2014) (citation omitted). In addition, a patentee cannot recapture in litigation a claim scope surrendered during the prosecution of the patent, either by amendment or argument. *See Pharmacia & Upjohn Co. v. Mylan Pharms., Inc.*, 170 F.3d 1373, 1376-77 (Fed. Cir. 1999).

6. “Extrinsic evidence may assist the court in understanding the underlying technology, the meaning of terms to one skilled in the art, and how the invention works.” *Allergan USA, Inc. v. Aurobindo Pharma Ltd.*, No. 19-cv-1727-RGA, 2021 WL 84368, at *2 (D. Del. Jan. 11, 2021) (Andrews, J.) (citing *Phillips*, 415 F.3d at 1317-19)); *see also id.*, at *3 (“Based on the extrinsic evidence, the plain and ordinary meaning of ‘dose,’ which a PHOSITA would have understood, ‘single dose’ is the amount of a pharmaceutical agent to be taken at one time. There is a difference between ‘single dose’ and ‘daily dose.’”).

7. Claims must be construed the same for purposes of infringement and invalidity. *See, e.g., Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) (“Because the claims of a patent measure the invention at issue, the claims must be interpreted and given the same meaning for purposes of both validity and infringement analyses.”); *Int'l Bus. Machs. Corp. v. Priceline Grp. Inc.*, 271 F. Supp. 3d 667, 687 (D. Del. 2017) (both parties “must apply the same constructions for both infringement and invalidity purposes.”). “[C]ourts should

not rewrite claims to preserve validity.” *Nazomi Commc’ns, Inc. v. ARM Holdings, PLC*, 403 F.3d 1364, 1368 (Fed. Cir. 2005). Doing so would improperly “put the validity cart before the claim construction horse.” *Id.* at 1369. Similarly, courts should not “adopt[] a narrower claim interpretation in order to preserve the claim’s validity[,]” thereby “glossing over the intrinsic evidence that must inform the court’s claim construction.” *Landers v. Sideways, LLC*, 142 F. App’x 462, 468 (Fed. Cir. 2005); *see also Abbott Lab’ys v. Baxter Pharm. Prods., Inc.*, 334 F.3d 1274, 1282 (Fed. Cir. 2003) (“[T]he district court erred by giving the claim term ‘effective amount’ a narrow reading to preserve its validity.”).

8. “A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.” 35 U.S.C. § 112(d). Accordingly, a dependent claim cannot be infringed unless each and every element of the underlying independent claim is also infringed. *Forest Lab’ys, Inc. v. Abbott Lab’ys*, 239 F.3d 1305, 1310-11 & n.3 (Fed. Cir. 2001). The fact that a dependent claim explicitly includes a certain limitation does not imply that such limitation is eschewed by the independent claim from which it depends. *See Trs. of Columbia Univ. in City of N.Y. v. Symantec Corp.*, 811 F.3d 1359, 1370 (Fed. Cir. 2016) (explaining that “construing the independent claim to exclude material[s] covered by the dependent claim would be inconsistent”).

9. There is a presumption that the same terms appearing in different portions of the claims should be given the same meaning, unless it is clear from the specification and prosecution history that the terms have different meanings. *Fin Control Sys. Pty, Ltd. v. OAM, Inc.*, 265 F.3d 1311, 1318 (Fed. Cir. 2001); *In re Varma*, 816 F.3d 1352, 1363 (Fed. Cir. 2016) (“[T]he principle that the same phrase in different claims of the same patent should have the same meaning is a strong one, overcome only if ‘it is clear’ that the same phrase has different meanings in different

claims.”); *Digital Biometrics, Inc. v. Identix, Inc.*, 149 F.3d 1335, 1345 (Fed. Cir. 1998) (“the meaning of a term in a claim must be defined in a[] manner that is consistent with its appearance in other claims in the same patent”).

10. “The doctrine of claim differentiation creates a presumption that distinct claims, particularly an independent claim and its dependent claim, have different scopes.” *World Class Tech. Corp. v. Ormco Corp.*, 769 F.3d 1120, 1125 (Fed. Cir. 2014); *see also Kraft Foods, Inc. v. Int'l Trading Co.*, 203 F.3d 1362, 1368 (Fed. Cir. 2000). This is “based on the common sense notion that different words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scope. The doctrine is not a hard and fast rule, but instead a rule of thumb that does not trump the clear import of the specification.” *Starhome*, 743 F.3d at 857-58 (citations and internal quotation marks omitted).

11. The Federal Circuit has repeatedly found that, for pharmaceutical treatment methods, when the claim language “is only a statement of purpose and intended result[,]” and the language “does not result in a manipulative difference in the steps of the claim[,]” such claim language is nonlimiting and has no patentable weight. *Bristol-Myers Squibb Co. v. Ben Venue Lab'ys, Inc.*, 246 F.3d 1368, 1375-76 (Fed. Cir. 2001); *see also In re Copaxone Consol. Cases*, 906 F.3d 1013, 1023 (Fed. Cir. 2018) (finding that claim language in a method of treatment patent that “does not change the express dosing amount or method already disclosed in the claims, or otherwise result in a manipulative difference in the steps of the claims” is non-limiting). Relying on *Bristol-Myers Squibb*, district courts have held that where “the language [of the dependent claim] does not require any action step to be taken as a consequence” and “the ‘actual method’ found in the underlying independent claim . . . remains the same[,]” such “claim language is construed to have no patentable weight.” *Regeneron Pharm., Inc. v. Mylan Pharm. Inc.*, No.

1:22-CV-61, 2023 WL 11891335, at *11-12 (N.D. W. Va. Apr. 19, 2023) (emphasis and citation omitted) (finding that claim language that “merely states a test result that a patient may or may not reach after the method is performed[,] . . . independently gives the language no patentable weight. . . . There is no change or modification to the underlying dosing regimen if the test result is obtained, or not.”); *Takeda Pharm. Co. v. Actavis Lab’ys FL, Inc.*, No. 15-451-RGA, 2016 WL 3193188, at *7 (D. Del. June 6, 2016) (“In method claims, statements of intended result or purpose . . . are generally not considered to be claim limitations where the ‘method [is] performed in the same way regardless whether or not the [intended result actually ensues]’”) (alterations in original; citation omitted).

1. Person of Ordinary Skill in the Art

12. Claim terms must be construed “in light of the knowledge of one of ordinary skill in the art.” See, e.g., *Aventis Pharms. Inc. v. Amino Chems. Ltd.*, 715 F.3d 1363, 1374-75 (Fed. Cir. 2013).

13. In determining the level of ordinary skill in the art, a court should consider the following factors: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007) (citations omitted). However, “[n]ot all [of the factors listed above] may be present in every case, and one or more of these or other factors may predominate in a particular case.” *Imperial Chem. Indus., PLC v. Danbury Pharmacal, Inc.*, 777 F. Supp. 330, 371 (D. Del. 1991) (alterations in original; citation omitted).

II. NON-INFRINGEMENT

A. Issues

14. Whether UTC has proven, by a preponderance of the evidence, that any third-party, including patients and healthcare providers, has or will directly infringe the '327 patent Asserted Claims under 35 U.S.C. § 271(a). *See Ex. 3 (Liquidia SOF), § VI.*

15. Whether UTC has proven, by a preponderance of the evidence, that Liquidia has or will directly infringe the '327 patent Asserted Claims under 35 U.S.C. § 271(a). *See Ex. 3 (Liquidia SOF), §§ VI.F, G.*

16. Whether UTC has proven, by a preponderance of evidence, that Liquidia has infringed the '327 patent Asserted Claims under 35 U.S.C. § 271(e) by submitting and amending NDA No. 213005. *See Ex. 3 (Liquidia SOF), § VI.*

17. Whether UTC has proven, by a preponderance of the evidence, that Liquidia has or will encourage or instruct any third party, including patients and healthcare providers, to practice methods that are equivalent to those claimed by the '327 patent Asserted Claims under the doctrine of equivalents. *See Ex. 3 (Liquidia SOF), § VI.F.*

18. Whether UTC has proven, by a preponderance of the evidence, that Liquidia has or will encourage or instruct any third-party, including patients and healthcare providers, to practice the methods of the '327 patent Asserted Claims. *See Ex. 3 (Liquidia SOF), §§ VI.A, C-E, G.*

19. Whether UTC has proven, by a preponderance of the evidence, that Liquidia has an affirmative intent to induce infringement of the '327 patent Asserted Claims under 35 U.S.C. § 271(b). *See Ex. 3 (Liquidia SOF), §§ VI.A, C-E, G.*

20. Whether UTC has proven, by a preponderance of the evidence, that Liquidia will induce infringement of the '327 patent Asserted Claims under 35 U.S.C. § 271(b). *See Ex. 3 (Liquidia SOF), § VI.*

21. Whether UTC has proven, by a preponderance of the evidence, that conduct of the ASCENT clinical trial has infringed the '327 patent Asserted Claims under 35 U.S.C § 271(a) and/or 35 U.S.C. § 271(b). *See Ex. 3 (Liquidia SOF), § VI.G.*

22. Whether Liquidia has proven that its ASCENT clinical trial meets the requirements of 35 U.S.C. § 271(e)(1) safe harbor. *See Ex. 3 (Liquidia SOF), § VI.G.*

23. Whether UTC has proven, by a preponderance of the evidence, that Liquidia has willfully infringed the '327 patent Asserted Claims. *See Ex. 3 (Liquidia SOF), § VI.H.*

24. Whether, under 35 U.S.C. § 271(e)(4), injunctive relief is the only available remedy in this Hatch-Waxman litigation where no commercial manufacture or sale of the claimed method has occurred, given that the statute expressly limits available remedies for infringement under § 271(e)(2).

B. Legal Standards

1. New Drug Applications under § 505(b)(2)

25. Under § 505(b)(2) of the Federal Food, Drug, and Cosmetic Act (“FD&C Act”), a party may submit a New Drug Application (“NDA”) for FDA approval of a new drug when certain investigations relied upon in the NDA “were not conducted by or for the applicant and for which the applicant has not obtained a right of reference or use from the person by or for whom the investigations were conducted[.]” Pub. L. 75-717, § 505(b)(2), 52 Stat. 1040, 1052-53 (1938) (codified at 21 U.S.C. § 355). Accordingly, a drug manufacturer may file an NDA for a drug that is not entirely new but is not merely a generic of a branded drug. *See* 21 U.S.C. § 355. The 505(b)(2) applicant must submit additional data to the FDA that demonstrates that any differences between the original drug and the § 505(b)(2) drug will not affect the § 505(b)(2) drug’s safety and efficacy. *See* 21 C.F.R. § 314.54(a) (requiring the § 505(b)(2) application to contain “information needed to support the modification(s) of the listed drug.”); *see also Belcher Pharms.,*

LLC v. Int'l Medication Sys., Ltd., 379 F. Supp. 3d 326, 328 n.1 (D. Del. 2019) (explaining that drugs seeking approval under § 355(b) require additional safety and efficacy data, whereas drugs seeking approval under § 355(j) require a demonstration of bioequivalence).

26. By contrast, Abbreviated New Drug Applications (“ANDAs”) are governed by § 505(j) of the FD&C Act, which does not require the generic drug company to conduct their own independent clinical trials to prove safety and efficacy because they can rely on the research of the pioneer pharmaceutical company after showing bioequivalence of the generic drug to the branded drug. 21 U.S.C. §§ 355(j)(2)(A)(iv), (j)(8)(B). Further, the generic drug company must show that the “route of administration, the dosage form, and the strength of the new drug are the same as those of the listed drug[.]” *Id.* at § 355(j)(2)(A)(iii).

27. Here, Liquidia submitted NDA No. 213005 and an amendment thereto under § 505(b)(2)—not an ANDA under § 505(j)—for FDA approval of its LIQ861 treprostinil dry powder inhalation product (proposed tradename YutreplaTM).

2. Infringement Generally

28. “The patent owner has the burden of proving infringement and must meet its burden by a preponderance of the evidence.” *Takeda Pharm. Co. v. Teva Pharms. USA, Inc.*, 668 F. Supp. 2d 614, 619 (D. Del. 2009). This burden never shifts to the defendants. *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008) (noting that the “burden to prove infringement” never shifts from the plaintiff and that “the risk of decisional uncertainty stays on the proponent of the proposition”). “[S]peculative data . . . cannot sustain [patentee’s] burden of proof.” *Brigham & Women’s Hosp., Inc. v. Perrigo Co.*, 761 F. App’x 995, 1003-04 (Fed. Cir. 2019).

29. An invalid claim cannot be infringed. *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580 (Fed. Cir. 1983) (“The claim being invalid there is nothing to be infringed.”).

3. Infringement in the Hatch-Waxman Context

30. Under 35 U.S.C. § 271(e)(2)(A), it is an act of infringement to submit an NDA under § 505(b)(2) of the FD&C Act (“§ 505(b)(2) NDA”) for a drug claimed in a patent or the use of which is claimed in a patent, if the purpose of such submission is to obtain approval to engage in the manufacture, use, or sale of the drug before the expiration of such patent. This “artificial” act of infringement creates jurisdiction to enable resolution of infringement disputes before the applicant has actually made or marketed the proposed product. *Warner-Lambert Co. v. Apotex Corp.*, 316 F.3d 1348, 1365 (Fed. Cir. 2003).

31. “Once jurisdiction is established, however, the substantive determination whether actual infringement or inducement will take place is determined by traditional patent infringement analysis, just the same as it is in other infringement suits, including those in a non-[Hatch-Waxman] context, the only difference being that the inquiries now are hypothetical because the allegedly infringing product has not yet been marketed.” *Warner-Lambert*, 316 F.3d at 1365. “The infringement case is therefore limited to an analysis of whether what the [accused infringer] is requesting authorization for in the [§ 505(b)(2) NDA] would be an act of infringement if performed.” *Id.* at 1364.

32. In the context of an allegation of infringement under 35 U.S.C. § 271(e)(2)(A), which is premised on an artificial act of infringement (*i.e.*, the filing of the § 505(b)(2) NDA), the infringement inquiry is hypothetical and requires the court to compare the claims with the product described in the § 505(b)(2) NDA. *See Bayer AG v. Elan Pharm. Rsch. Corp.*, 212 F.3d 1241, 1248-49 (Fed. Cir. 2000). However, a patentee cannot rely solely on the filing of a § 505(b)(2) NDA under § 271(e)(2)(A) to establish infringement: “[T]he patentee’s burden of proving ultimate infringement is not met by the filing of the [§ 505(b)(2) NDA].” *See Glaxo, Inc. v. Novopharm, Ltd.*, 110 F.3d 1562, 1570 (Fed. Cir. 1997). The burden of proof does not shift to the § 505(b)(2)

NDA applicant merely by the filing of the § 505(b)(2) NDA. *Id.* (“The relevant inquiry is whether the patentee has proven by a preponderance of the evidence that the alleged infringer will likely market an infringing product.”).

33. The § 505(b)(2) NDA “controls the infringement analysis when it speaks to a claim limitation, and the Court should examine other materials to look at the product that the [§ 505(b)(2) NDA applicant] company is likely to sell when the [§ 505(b)(2) NDA] is silent on that limitation.” *See Exela Pharma Scis., LLC v. Eton Pharms., Inc.*, C.A. No. 1:20-cv-00365-MN, 2022 WL 806524, at *2-3 (D. Del. Feb. 8, 2022). The Federal Circuit has explained:

In some cases, the ANDA specification directly resolves the infringement question because it defines a proposed generic product in a manner that either meets the limitations of an asserted patent claim or is outside the scope of such a claim. *See Sunovion Pharm[s]., Inc. v. Teva Pharm[s] USA, Inc.*, 731 F.3d 1271, 1279-80 (Fed. Cir. 2013) (proposed generic product infringed because the ANDA specification described an amount of stereoisomer within the scope of the asserted patent claim); *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1248-50 (Fed. Cir. 2000) (proposed generic product did not infringe because the ANDA specification required a surface area outside of the range claimed by the asserted patent). In cases in which the ANDA specification does not resolve the infringement question in the first instance, we have endorsed the district court’s reference to relevant evidence, including biobatch data and actual samples of the proposed generic composition that the ANDA filer had submitted to the FDA. *See [Glaxo, Inc. v. Novopharm, Ltd.]*, 110 F.3d 1562, 1569 (Fed. Cir. 1997)] (proposed generic product did not infringe because the ANDA specified only one crystalline form with certain purity, but did not reveal whether a different crystalline form claimed by the asserted patents would be present at all).

Ferring B.V. v. Watson Lab’ys, Inc.-Fla., 764 F.3d 1401, 1408-09 (Fed. Cir. 2014); *see also id.* at 1409 (“This case is more like *Glaxo* than either *Sunovion* or *Bayer* because Watson’s ANDA specification does not itself resolve the question of infringement.”); *see also Exela*, 2022 WL 806524, at *3 (“Consequently, the [*Ferring v. Watson*] panel endorsed an infringement analysis based on all evidence relevant to what the generic applicant was likely to bring to market.”); *cf.*

Par Pharm., Inc. v. Hospira, Inc., 835 F. App'x 578, 586 (Fed. Cir. 2020) (looking no further than the ANDA specification because “the ANDA is not silent as to whether [the generic’s] product could contain sufficient concentrations of elemental impurities such that” a claim limitation would be met).

4. Infringement of a Method of Treatment

34. A method claim “is not infringed unless all the steps are carried out.” *Limelight Networks, Inc. v. Akamai Techs., Inc.*, 572 U.S. 915, 921 (2014); *see also Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311 (Fed. Cir. 2006) (“Method claims are only infringed when the claimed process is performed, not by the sale of an apparatus that is capable of infringing use.”); *Joy Techs., Inc. v. Flakt, Inc.*, 6 F.3d 770, 773 (Fed. Cir. 1993) (holding “[t]he sale of [an apparatus capable of performing a claimed process is] not a direct infringement because a method or process claim is directly infringed only when the process is performed”); *Standard Havens Prods., Inc. v. Gencor Indus., Inc.*, 953 F.2d 1360, 1374 (Fed. Cir. 1991) (holding method claims were not directly infringed by the mere sale of an apparatus capable of performing the claimed process)).

5. Direct Infringement

35. Under 35 U.S.C. § 271(a), “whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.” 35 U.S.C. § 271(a). “Under this form of liability, a defendant’s mental state is irrelevant. Direct infringement is a strict-liability offense.” *Commil USA, LLC v. Cisco Sys., Inc.*, 575 U.S. 632, 638-639 (2015).

36. Determining direct infringement is a two-step inquiry. Step one is to construe the disputed terms of the patent at issue; step two is to compare the accused products with the properly construed claims of the patent. *Alza Corp. v. Andrx Pharms., LLC*, 607 F. Supp. 2d 614, 623 (D.

Del. 2009). “Step one is a question of law; step two is a question of fact.” *Id.*; *see also Wavetronix LLC v. EIS Elec. Integrated Sys.*, 573 F.3d 1343, 1354 (Fed. Cir. 2009).

37. An accused product or method is not infringing unless it contains each and every limitation of the claim, either literally or by an equivalent. *See Minerva Surgical, Inc. v. Hologic, Inc.*, C.A. No. 18-00217-JFB-SRF, 2021 WL 3048447, at *6 (D. Del. July 20, 2021) (citing *PSN Illinois, LLC v. Ivoclar Vivadent, Inc.*, 525 F.3d 1159, 1168 (Fed. Cir. 2008)).

a) Step One: Claim Construction

38. The first step of an infringement analysis requires the Court to construe the claim terms at issue. *See supra* § I.B.

b) Step Two: Comparison of Accused Product to Asserted Claims

39. The second step of an infringement analysis requires the Court to compare the accused product to the asserted claims as properly construed. *Bai v. L & L Wings, Inc.*, 160 F.3d 1350, 1353 (Fed. Cir. 1998).

40. “Infringement, literal or by equivalence, is determined by comparing the accused product not with a preferred embodiment described in the specification, or with a commercialized embodiment of the patentee, but with the properly and previously construed claims in suit.” *StairMaster Sports/Med. Prods. v. Groupe Procycle, Inc.*, 25 F. Supp. 2d 270, 278 (D. Del. 1998) (citation omitted).

41. Indeed, “[a]s a general rule, ‘it is error for a court to compare in its infringement analysis the accused product or process with the patentee’s commercial embodiment or other version of the product or process; the only proper comparison is with the claims of the patent.’” *AMAG Pharmas. v. Sandoz, Inc.*, C.A. No. 16-cv-1508 (PGS), 2018 WL 1041035, at *1 (D.N.J. Feb. 22, 2018) (quoting *Zenith Lab[’ys], Inc. v. Bristol-Myers Squibb Co.*, 19 F.3d 1418, 1423

(Fed. Cir. 1994)); *AquaTex Indus., Inc. v. Techniche Sols.*, 479 F.3d 1320, 1327-28 (Fed. Cir. 2007) (holding that infringement inquiry, including infringement by both literal or equivalence, “leaves no room for consideration of the patentee’s product”); *Johnson & Johnston Assocs. Inc. v. R.E. Serv. Co.*, 285 F.3d 1046, 1052 (Fed. Cir. 2002) (en banc) (“[T]he law of infringement compares the accused product with the claims as construed by the court. . . . [And not] ‘with a . . . commercialized embodiment of the patentee.’”) (citation omitted).

(1) Literal Infringement

42. “Literal infringement occurs when each element of at least one claim of the patent is found in the alleged infringer’s product.” *Alza*, 607 F. Supp. 2d at 623; *see also DeMarini Sports, Inc. v. Worth, Inc.*, 239 F.3d 1314, 1331 (Fed. Cir. 2001).

43. “If, however, even one claim limitation is missing or not met, there is no literal infringement.” *MicroStrategy Inc. v. Bus. Objects, S.A.*, 429 F.3d 1344, 1352 (Fed. Cir. 2005); *see also Bayer*, 212 F.3d at 1247 (“If any claim limitation is absent from the accused device, there is no literal infringement as a matter of law.”); *Glaxo*, 110 F.3d at 1566 (“It is elementary patent law that all limitations are material[,]” and plaintiff is “required to establish the presence of each limitation of the asserted claims.”). Likewise, if there is any deviation from any claim limitation, there can be no literal infringement. *See, e.g., DeMarini Sports*, 239 F.3d at 1331; *Wavetronix*, 573 F.3d at 1358-59.

(2) Infringement Under Doctrine of Equivalents

44. Under the doctrine of the equivalents, “a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is ‘equivalence’ between the elements of the accused product or process and the claimed elements of the patented invention.” *Honeywell Int’l, Inc. v. Hamilton Sundstrand Corp.*, 523 F.3d 1304, 1312

(Fed. Cir. 2008) (citation omitted). To prove equivalence, the patentee must “show[] that the difference between the claimed invention and the accused product [is] insubstantial.” *Stumbo v. Eastman Outdoors, Inc.*, 508 F.3d 1358, 1364 (Fed. Cir. 2007). “One way of doing so is by showing on a limitation by limitation basis that the accused product performs substantially the same function in substantially the same way with substantially the same result” as the corresponding limitation claimed in the patent. *Id.* The doctrine of equivalents must be applied to each individual element of a claim, not to the invention as a whole. *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997). A patentee must present “particularized testimony and linking argument” to support a theory of infringement under the doctrine of equivalents. *Am. Calcar, Inc. v. Am. Honda Motor Co.*, 651 F.3d 1318, 1338-39 (Fed. Cir. 2011).

6. Indirect Infringement: Induced Infringement under § 271(b)

45. Where an entity has not directly committed an act of infringement but has acted in a manner leading to direct infringement by another, that entity may be held liable for “indirect infringement” for inducing infringement under 35 U.S.C. § 271(b). *Joy Techs.*, 6 F.3d at 774.

46. Direct infringement is a predicate for a finding of induced infringement. *Limelight Networks*, 572 U.S. at 922 (“[A]s both the Federal Circuit and respondents admit, where there has been no direct infringement, there can be no inducement of infringement under § 271(b).”); *C.R. Bard, Inc. v. Advanced Cardiovascular Sys., Inc.*, 911 F.2d 670, 673 (Fed. Cir. 1990) (“[A] finding of induced or contributory infringement must be predicated on a direct infringement of [the asserted] claim[.]”).

47. Direct infringement of a method claim “occurs where all steps of a claimed method are performed by or attributable to a single entity.” *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 797 F.3d 1020, 1022 (Fed. Cir. 2015) (en banc). An entity is responsible for others’ performance of method steps “where that entity directs or controls others’ performance” and/or

“where the actors form a joint enterprise.” *Id.* Courts rely on general principles of vicarious liability to determine if a single entity controls the acts of another. *Id.* However, according to the Federal Circuit, indirect infringement based on direction and control requires that customers do more than merely take a vendor’s guidance and act independently on their own. *Id.* at 1025.

48. “Whoever actively induces infringement of a patent shall be liable as an infringer.” 35 U.S.C. § 271(b). “A person induces infringement under § 271(b) by actively and knowingly aiding and abetting another’s direct infringement.” *C.R. Bard*, 911 F.2d at 675 (emphasis omitted). Induced infringement requires proof of direct infringement. Thus, in order to succeed on a claim of inducement, “the patentee must show, first that there has been direct infringement, and second that the alleged infringer knowingly induced infringement and possessed specific intent to encourage another’s infringement.” *Kyocera Wireless Corp. v. Intl Trade Comm’n*, 545 F.3d 1340, 1353-54 (Fed. Cir. 2008) (citation omitted). This requires showing that the alleged infringer had “knowledge that the induced acts constitute patent infringement.” *Dynamic Data Techs., LLC v. Brightcove Inc.*, C.A. No. 19-1190-CFC, 2020 WL 4192613, at *2 (D. Del. July 21, 2020) (citation omitted); *see also Commil*, 575 U.S. at 642 (explaining that indirect infringement “requires proof the defendant knew the [accused] acts were infringing”). Additionally, “[i]t must be established that the defendant possessed *specific intent* to encourage another’s infringement and not merely that the defendant had knowledge of the acts alleged to constitute inducement.” *DSU Med. Corp. v. JMS Co.*, 471 F.3d 1293, 1306 (Fed. Cir. 2006) (emphasis added) (citation omitted); *see also Ecolab, Inc. v. FMC Corp.*, 569 F.3d 1335, 1351 (Fed. Cir. 2009) (finding that “even though [defendant’s] product was ultimately found to infringe, the jury had substantial evidence from which it could have reasonably concluded that [defendant] did not induce infringement because it lacked the required intent”). Intent cannot be inferred. *See Warner-Lambert*, 316 F.3d at 1365

(“[W]here a product has substantial noninfringing uses, intent to induce infringement cannot be inferred even when [the accused infringer] has actual knowledge that some users of its product may be infringing the patent.”); *Takeda Pharms. U.S.A., Inc. v. West-Ward Pharm. Corp.*, 785 F.3d 625, 631-32 (Fed. Cir. 2015) (explaining that the accused infringer’s mere knowledge of infringing “off-label” uses was not sufficient under the general principles of inducement liability).

49. Moreover, the patentee must prove that the defendant was responsible for the “commission of an affirmative act” in furtherance of the direct infringement of another. *Beverly Hills Fan Co. v. Royal Sovereign Corp.*, 21 F.3d 1558, 1569-70 & n.25 (Fed. Cir. 1994). In general, “inducement has connotations of *active steps knowingly taken*—knowingly at least in the sense of purposeful, intentional as distinguished from accidental or inadvertent.” *Tegal Corp. v. Tokyo Electron Co.*, 248 F.3d 1376, 1378-79 (Fed. Cir. 2001) (citation omitted). “The failure of an infringer to obtain the advice of counsel with respect to any allegedly infringed patent, or the failure of the infringer to present such advice to the court or jury, may not be used to prove that the accused infringer … intended to induce infringement of the patent.” 35 U.S.C. § 298.

50. In the Hatch-Waxman context, the Federal Circuit has made clear that the patentee must prove that the accused infringer will actually promote or encourage others—here, pharmacists, physicians, nurses, patients, or other end users—to directly infringe the patent by using the drug for the patented use. *Warner-Lambert*, 316 F.3d at 1364-65. To induce infringement of a patented method, a drug “label must encourage, recommend, or promote infringement.” *Takeda*, 785 F.3d at 631-32 (finding no induced infringement); *see also HZNP Meds. LLC v. Actavis Lab’ys UT, Inc.*, 940 F.3d 680, 701-02 (Fed. Cir. 2019) (same); *Grunenthal GMBH v. Alkem Lab’ys Ltd.*, 919 F.3d 1333, 1339 (Fed. Cir. 2019) (finding no induced infringement when the label included both infringing and non-infringing uses, but did “not

specifically encourage use” of the patented treatment); *Ferring Pharm. Inc. v. Lupin Inc.*, C.A. No. 1:19-cv-913-RGA, 2020 WL 3414750, at *3-5 (D. Del. June 22, 2020) (Andrews, J.) (finding no induced infringement when the label’s “instruction does not rise to the level of encouraging, recommending, or promoting” an infringing use); *Lundbeck A/S v. Lupin Ltd.*, C.A. No. 18-88-LPS, 2021 WL 4944963, at *105-07 (D. Del. Sept. 30, 2021) (finding no induced infringement when “the labels do not encourage, recommend, or promote practice” of the claim limitation). “[V]ague label language cannot be combined with speculation about how physicians may act to find inducement.” *Takeda*, 785 F.3d at 632.

7. Willful Infringement

51. The Supreme Court has held that “subjective willfulness of a patent infringer, intentional or knowing, may warrant enhanced damages, without regard to whether his infringement was objectively reckless.” *Halo Elecs., Inc. v. Pulse Elecs., Inc.*, 579 U.S. 93, 105 (2016). “[P]unishment should generally be reserved for egregious cases typified by willful misconduct.” *Id.* at 106. In order to demonstrate willful infringement, a plaintiff must prove by a preponderance of the evidence that the defendant “actually knew or should have known that its actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.” *Arctic Cat Inc. v. Bombardier Recreational Prod. Inc.*, 876 F.3d 1350, 1371 (Fed. Cir. 2017) (internal quotation marks omitted). “To determine whether an accused infringer’s conduct was subjectively willful, the Court must ‘measure[]’ the accused infringer’s ‘culpability . . . against the knowledge of the actor at the time of the challenged conduct.’” *Masimo Corp. v. Philips Elecs. N. Am. Corp.*, C.A. Nos. 09-80-LPS, 11-742-LPS, 2016 WL 6542726, at *15 (D. Del. Oct. 31, 2016) (alteration in original) (quoting *Halo*, 579 U.S. at 105). Additionally, the standard for willfulness is not akin to wanton, malicious, or bad-faith behavior. *SRI Int'l, Inc. v. Cisco Sys., Inc.*, 14 F.4th

1323, 1329-30 (Fed. Cir. 2021). Rather “the concept of ‘willfulness’ requires a [factfinder] to find no more than deliberate or intentional infringement.” *Id.* at 1330 (citation omitted).

52. Awareness of the patents-in-suit, without more, cannot establish willful infringement. *See SRI Int'l, Inc. v. Cisco Sys., Inc.*, 930 F.3d 1295, 1308-09 (Fed. Cir. 2019); *Vehicle IP, LLC v. AT&T Mobility LLC*, 227 F. Supp. 3d 319, 331 (D. Del. 2016) (“Vehicle IP does not identify other evidence, beyond pre-suit knowledge of the patent, that could show that the TCS Defendants’ infringement was ‘egregious,’ ‘deliberate,’ ‘wanton,’ or otherwise characteristic of the type of infringement that warrants the Court exercising its discretion to impose the ‘punitive’ sanction of enhanced damages.”) (citation omitted); *Greatbatch Ltd. v. AVX Corp.*, C.A. No. 13-cv-723-LPS, 2016 WL 7217625, at *3 (D. Del. Dec. 13, 2016) (“[A] party’s pre-suit knowledge of a patent is not sufficient, by itself, to find ‘willful misconduct’ of the type that may warrant an award of enhanced damages.”).

53. Further, “[t]here can be no willful infringement before a patent is issued.” *Bioverativ Inc. v. CSL Behring LLC*, C.A. No. 17-cv-914-RGA, 2020 WL 1332921, at *2 (D. Del. Mar. 23, 2020). Knowledge of a patent application cannot support a willfulness finding. *See, e.g.*, *iFIT v. Peloton Interactive, Inc.*, C.A. No. 21-507-RGA, 2022 WL 609605, at *2 (D. Del. Jan. 28, 2022) (knowledge of application is not enough to establish willfulness); *accord Robocast, Inc. v. Microsoft Corp.*, 21 F. Supp. 3d 320, 334-35 (D. Del. 2014) (granting summary judgment of no willfulness despite knowledge of patent application); *Helios Streaming, LLC v. Vudu, Inc.*, C.A. No. 19-1792-CFC-SRF, 2021 WL 254069, at *4-5 (D. Del. Jan. 26, 2021) (granting motion to dismiss despite knowledge of patent application).

8. Safe Harbor and Stockpiling

54. As relevant to Hatch-Waxman cases, the safe harbor under 35 U.S.C. § 271(e)(1) provides that “[i]t shall not be an act of infringement to make, use, offer to sell, or sell within the

United States or import into the United States a patented invention . . . solely for uses reasonably related to the development and submission of information under a Federal law which regulates the manufacture, use, or sale of drugs or veterinary biological products.” The Supreme Court interpreted this safe harbor broadly in the seminal 2005 case, *Merck KGaA v. Integra Lifesciences I, Ltd.*, recognizing that “[t]hough the contours of this provision are not exact in every respect, the statutory text makes clear that it provides a wide berth for the use of patented drugs in activities related to the federal regulatory process.” 545 U.S. 193, 202 (2005) (further finding that the safe harbor “necessarily includes preclinical studies of patented compounds that are appropriate for submission to the FDA in the regulatory process”). “[S]afe harbor is available to defendants irrespective of the stage of research and even if the information is never ultimately submitted to the FDA” and “the exemption applies ‘as long as there is a reasonable basis for believing’ that the use of the patented invention will produce the types of information that are relevant to an FDA submission.” *Edwards Lifesciences Corp. v. Meril Life Scis. Pvt. Ltd.*, 96 F.4th 1347, 1351, 1353 (Fed. Cir. 2024) (holding that the infringing activity—importation of transcatheter heart valves—“constituted another step in the right direction ‘on the road to regulatory approval.’”) (quoting *Merck KGaA*, 545 U.S. at 207).

55. As long as the safe harbor applies, courts “do[] not look to the underlying purposes or attendant consequences of the activity[.]” *AbTox, Inc. v. Exitron Corp.*, 122 F.3d 1019, 1030 (Fed. Cir. 1997) (finding the safe harbor applies when testing was conducted to secure FDA approval, even though that testing ultimately led to sales); *see also Nexell Therapeutics, Inc. v. Amcell Corp.*, 199 F. Supp. 2d 197, 204 (D. Del. 2002) (“As a policy matter, inquiring into the motivation behind activities that are conducted under the auspices of FDA-approved clinical trials

would be contrary to Congress's intent in enacting § 271(e)(1), because it would chill parties from engaging in the very pre-approval testing that Congress sought to encourage.”).

9. Remedy

56. In Hatch-Waxman litigation, if a court finds infringement under 35 U.S.C. § 271(e)(2) the court may grant injunctive relief against the infringer to prevent the commercial manufacture, use, offer to sell, or sale within the United States or importation into the United States of the infringing product. 35 U.S.C. § 271(e)(4). A court may also award attorney fees under 35 U.S.C. § 285 for infringement under § 271(e)(2). *Id.*; *see infra* § V.B.

57. When a party seeks final adjudication of Hatch-Waxman infringement and validity by the Court, it waives its right to a jury trial on those issues. *See Astellas Pharma Inc. v. Sandoz Inc.*, No. 1:20-cv-01589, 2024 WL 4554799, at *5 (D. Del. Oct. 22, 2024).

58. To the extent a party launches its product “at-risk” during the pendency of a case, a patentee may pursue a claim for damages after it prevails on its infringement claims. *See id.* at 4-5.

59. A party waives their right to a trial by jury if no demand is made within 14 days of the last allowed pleading. *See Fed. R. Civ. P. 38.*

III. INVALIDITY

A. Issues

60. Whether UTC has met its burden of demonstrating that the '327 patent Asserted Claims are entitled to the earliest claimed priority date of April 17, 2020, including whether UTC has met its burden of proving that U.S. Provisional Application No. 62/011,810 provides adequate written description support for the '327 patent Asserted Claims. *See Ex. 3 (Liquidia SOF), § VII.*

61. Whether Liquidia has proven, by clear and convincing evidence, that the '327 patent Asserted Claims are not entitled to their earliest claimed priority date of April 17, 2020. *See* Ex. 3 (Liquidia SOF), § VII.

62. If the priority date of the '327 patent Asserted Claims is March 12, 2021, whether Liquidia has proven, by clear and convincing evidence, that the February 2020 Press Release (DTX0265) constitutes “prior art” to the '327 Asserted Claims under 35 U.S.C. § 102(a). *See* Ex. 3 (Liquidia SOF), § VIII.C.

63. Whether Liquidia has proven, by clear and convincing evidence, that the subject matter of the '327 patent Asserted Claims was described in a printed publication, in public use, on sale, or otherwise available to the public before the priority date. *See* Ex. 3 (Liquidia SOF), § VIII.

64. Whether Liquidia has proven by clear and convincing evidence that the '327 Asserted Claims are invalid for prior public use under 35 U.S.C. § 102. *See* Ex. 3 (Liquidia SOF), § VIII.A.

65. Whether Liquidia has proven by clear and convincing evidence that the '327 Asserted Claims are invalid for prior sale under 35 U.S.C. § 102. *See* Ex. 3 (Liquidia SOF), § VIII.B.

66. Whether Liquidia has proven, by clear and convincing evidence, that the references Faria-Urbina 2018 (DTX0348), U.S. Patent No. 10,716,793 (the “'793 patent”) (DTX0002), Saggar 2014 (DTX0010), Agarwal 2015 (DTX0137), Parikh 2016 (DTX0051), 2009 Tyvaso Label (DTX0357), and 2017 INCREASE Study Description (DTX0008) constitute “prior art” to the '327 patent Asserted Claims under 35 U.S.C. § 102(a). *See* Ex. 3 (Liquidia SOF), §§ V, VII.

67. Whether Liquidia has proven, by clear and convincing evidence, that the '327 patent Asserted Claims are invalid as anticipated under 35 U.S.C. § 102. *See Ex. 3 (Liquidia SOF), § VIII.C.*

68. Whether Liquidia has proven, by clear and convincing evidence, that the '327 patent Asserted Claims are invalid as inherently anticipated under 35 U.S.C. § 102. *See Ex. 3 (Liquidia SOF), § VIII.D.*

69. Whether Liquidia has proven, by clear and convincing evidence, that the '327 patent Asserted Claims are invalid as obvious under 35 U.S.C. § 103. *See Ex. 3 (Liquidia SOF), § IX.*

70. Whether UTC has met its burden of production of evidence of secondary considerations of nonobviousness with respect to the '327 Asserted Claims, including whether UTC has established a nexus between those secondary considerations and the alleged inventions of the asserted claims. *See Ex. 3 (Liquidia SOF), § IX.D.*

71. Whether Liquidia has proven, by clear and convincing evidence, that the '327 Asserted Claims are invalid for inadequate written description under 35 U.S.C. § 112. *See Ex. 3 (Liquidia SOF), § X*

72. Whether Liquidia has proven, by clear and convincing evidence, that '327 patent is invalid for failure to name the correct inventor under 35 U.S.C. § 101. *See Ex. 3 (Liquidia SOF), § XI.*

B. Legal Authority

1. Invalidity Generally

73. Federal Circuit precedent governs matters of substantive patent law in this Court. The Federal Circuit has adopted the decisions of the C.C.P.A. as its own precedent, making those

decisions binding on this Court. *S. Corp. v. United States*, 690 F.2d 1368, 1370-71 (Fed. Cir. 1982) (en banc).

74. Patent invalidity is a complete defense to a charge of infringement. *Weatherchem Corp. v. J.L. Clark, Inc.*, 163 F.3d 1326, 1335-36 (Fed. Cir. 1998). A patent is invalid if it fails to satisfy any of the conditions for patentability found in 35 U.S.C. § 101 *et seq.*

75. Under § 282 of the Patent Act, a patent issued by the Patent and Trademark Office (“PTO”) is presumed to be valid. 35 U.S.C. § 282(a). “The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.” *Id.* Because of this presumption, invalidity must be established by facts supported by “clear and convincing evidence.” *Microsoft Corp. v. i4i Ltd. P’ship*, 564 U.S. 91, 95 (2011); *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359-60 (Fed. Cir. 1984), *cert. denied*, *Sowa & Sons, Inc. v. Am. Hoist & Derrick Co.*, 469 U.S. 821 (1984), *abrogated on other grounds by Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1288 (Fed. Cir. 2011).

76. However, the presumption of validity is “far from determinative,” and a trial court is free to consider the evidence and decide the issue differently from the PTO. *See AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1245 (Fed. Cir. 2003). Additionally, the presumption of validity and the clear and convincing burden of proof “are static and in reality different expressions of the same thing—a single hurdle to be cleared.” *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1258 (Fed. Cir. 2004) (quoting *Am. Hoist*, 725 F.2d at 1360). Thus, the presumption of validity “does not constitute ‘evidence’ to be weighed against the challenger’s evidence.” *Chiron*, 363 F.3d at 1258-59 (citation omitted). Once the party asserting invalidity “has presented a prima facie case of invalidity, the patentee has the burden of going forward with rebuttal evidence.” *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1360 (Fed. Cir. 2007). If the patentee fails to do so, the patent cannot

be found valid. *See, e.g., Ralston Purina Co. v. Far-Mac-Co, Inc.*, 772 F.2d 1570, 1573 (Fed. Cir. 1985) (if the patent challenger makes a prima facie case of invalidity, “the party relying on validity is then *obligated* to come forward with evidence to the contrary” (emphasis added)).

77. A patent can be rendered invalid in litigation based on prior art that was before the PTO during prosecution. *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1366-67 (Fed. Cir. 2007); *IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1381 (Fed. Cir. 2005); *Celeritas Techs., Ltd. v. Rockwell Int'l Corp.*, 150 F.3d 1354, 1360-61 (Fed. Cir. 1998) (finding that the district court should have granted judgment of invalidity as a matter of law despite the fact that prior art relied on was before the PTO); *Am. Hoist*, 725 F.2d at 1359-60. The fact that a reference was previously considered by the PTO merely goes to the weight of that reference’s evidence and does not increase the burden of proof or preclude a finding of invalidity. *See Sciele Pharma Inc. v. Lupin Ltd.*, 684 F.3d 1253, 1260 (Fed. Cir. 2012) (stating that “[w]hether a reference was previously considered by the PTO, the burden of proof is the same: clear and convincing evidence of invalidity”). Thus, “there is no heightened or added burden that applies to invalidity defenses that are based upon references that were before the Patent Office.” *Id.*

78. No deference is due to the PTO “with respect to evidence it did not consider.” *Am. Hoist*, 725 F.2d at 1360. Therefore, “[t]he Courts are the final arbiter of patent validity and, although courts may take cognizance of, and benefit from, the proceedings before the patent examiner, the question is ultimately for the courts to decide, without deference to the rulings of the patent examiner.” *Commissariat À L’Energie Atomique v. Samsung Elecs. Co.*, 524 F. Supp. 2d 520, 526 (D. Del. 2007) (alteration in original; citations omitted).

2. Patents Are Often Declared Invalid

79. The United States Supreme Court has long recognized that “[i]t is as important to the public that competition should not be repressed by worthless patents, as that the patentee of a

really valuable invention should be protected in his monopoly[.]” *Pope Mfg. Co. v. Gormully*, 144 U.S. 224, 234 (1892).

80. The patent statutes include specific requirements that must be satisfied to obtain a patent—namely, “novelty” and “nonobviousness”—which “embody a congressional understanding, implicit in the Patent Clause itself, that free exploitation of ideals will be the rule, to which the protection of a federal patent is the exception.” *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 151 (1989). These requirements “exclude from consideration for patent protection knowledge that is already available to the public. They express a congressional determination that the creation of a monopoly is such information would not only serve no socially useful purpose, but would in fact injure the public by removing existing knowledge from public use.” *Id.* at 148.

81. Often, a patent’s claims are allowed by the PTO despite not satisfying the requirements of novelty and nonobviousness. *See Lear, Inc. v. Adkins*, 395 U.S. 653, 670 (1969).

82. Indeed, as this Court is aware, the Federal Circuit affirmed this Court’s finding of invalidity with respect to U.S. Patent No. 9,953,066 in *United Therapeutics Corp. v. Liquidia Technologies, Inc.*, 624 F. Supp. 3d 436 (D. Del. 2022), *aff’d*, 74 F.4th 1360 (Fed. Cir. 2023), *cert. denied*, *Liquidia Technologies, Inc. v. United Therapeutics Corp.*, 144 S. Ct. 873 (2024). And the Federal Circuit also affirmed the PTAB’s finding that the ’793 patent, also a patent-in-suit of *United Therapeutics Corp. v. Liquidia Techs., Inc.*, 624 F. Supp. 3d 436 (D. Del. 2022) is invalid. *See Liquidia Techs., Inc. v. United Therapeutics Corp.*, IPR2021-00406, 2022 WL 2720717, at *18-19 (P.T.A.B. July 19, 2022), *aff’d*, *United Therapeutics Corp. v. Liquidia Techs., Inc.*, No. 2023-1805, 2023 WL 8794633, at *1 (Fed. Cir. Dec. 20, 2023), *cert. denied*, 145 S. Ct. 352 (2024).

3. Prior Art

83. To qualify as a prior art reference for purposes of anticipation or obviousness, a reference must fall within one of the categories enumerated in 35 U.S.C. § 102. *See* 35 U.S.C. §§ 102, 103. Section 102(a)(1) provides that “[a] person shall be entitled to a patent unless . . . the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention[.]” 35 U.S.C. § 102(a)(1).

84. Additionally, Section 102(a)(2) provides that “[a] person shall be entitled to a patent unless . . . the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.” 35 U.S.C. § 102(a)(2). In other words, a patent filed before the effective filing date of the challenged patent is prior art, unless it falls within a statutory exception. *See* 35 U.S.C. § 102(b).

85. Whether a reference is prior art is determined based on “the effective filing date of the claimed invention.” *See* 35 U.S.C. §§ 102(a)(1)-(2).

4. Priority

86. A patent is “entitled to the benefit of an earlier filed provisional application” by the same inventors and disclosing the same invention. *See* 35 U.S.C. § 119(e); *see also Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

87. Under 35 U.S.C. § 119(e)(1), an applicant can claim priority in a nonprovisional application to a provisional application only if the provisional application described the invention claimed in the nonprovisional application in a manner that satisfies the requirements of § 112(a) and the claim is made within 12 months of the filing date of the provisional application. *See*

35 U.S.C. § 119(e)(1). This requires that the specification of the provisional application must “contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise, and exact terms,” to enable a POSA “to practice the invention claimed in the non-provisional application.” *Dynamic Drinkware*, 800 F.3d at 1378 (emphasis omitted) (holding that the asserted provisional did not provide written description support for the later-claimed invention) (citing *New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*, 298 F.3d 1290, 1294 (Fed. Cir. 2002)). “The primary considerations in a written description analysis are factual and must be assessed on a case-by-case basis.” *Regents of the Univ. of Minnesota v. Gilead Scis., Inc.*, 61 F.4th 1350, 1356 (Fed. Cir. 2023) (finding that the priority applications did not provide *ipsis verbis* support or “sufficient blaze marks” to guide a POSA to the claimed invention, and therefore did not satisfy the written description requirement).

88. The patentee bears the initial burden of going forward with evidence that the asserted claims are entitled to the benefit of the earlier filing date by explaining why the written description in the earlier application supports the claims. *See Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008). After the patentee meets its burden, the challenger then has the burden of persuading the court by clear and convincing evidence that the asserted patent is not entitled to the benefit of the earlier filing date. *See id.* at 1327-28.

5. Anticipation

89. A claimed invention must be novel to satisfy the requirements of patentability. *See C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1349 (Fed. Cir. 1998). A patent claim is not novel if it was disclosed in a prior art reference. *See generally* 35 U.S.C. § 102. “Under 35 U.S.C. § 102, a claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference.” *King Pharms., Inc v. Eon Labs, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010)

(citation and internal quotation marks omitted); *Schering Corp. v. Geneva Pharms., Inc.*, 339 F.3d 1373, 1379 (Fed. Cir. 2003). .

90. “The disclosure in an assertedly anticipating reference must be adequate to enable possession of the desired subject matter.” *Elan Pharms., Inc. v. Mayo Found. for Med. Educ. & Rsch.*, 346 F.3d 1051, 1055 (Fed. Cir. 2003). “For a prior-art reference to be enabling, it need not enable the claim in its entirety, but instead the reference need only enable a single embodiment of the claim.” *In re Morsa*, 803 F.3d 1374, 1377 (Fed. Cir. 2015). Anticipatory enablement is a less demanding standard than enablement under 35 U.S.C. § 112. See *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008) (referencing “the lower enablement standard for prior art”). In particular, anticipatory enablement does not require “actual performance” of the enabling disclosure. *Novo Nordisk Pharms., Inc. v. Bio-Technology Gen. Corp.*, 424 F.3d 1347, 1355 (Fed. Cir. 2005); see also *In re Antor Media Corp.*, 689 F.3d 1282, 1290 (Fed. Cir. 2012); *Ben Venue Lab’ys*, 246 F.3d at 1379. “Rather, anticipation only requires that those suggestions be enabled to one of skill in the art.” *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1383 (Fed. Cir. 2015) (quoting *Novo Nordisk*, 424 F.3d at 1355). The “knowledge of the art” at the patent’s priority date is relevant to that inquiry. *Iovate Health Scis., Inc. v. Bio-Engineered Supplements & Nutrition, Inc.*, 586 F.3d 1376, 1383 (Fed. Cir. 2009); see also *Novo Nordisk*, 424 F.3d at 1356 (finding anticipatory enablement based on what “would have been understood by one of ordinary skill in the art”).

91. A district court should presume that prior patents and printed publications are enabled. See *In re Antor Media*, 689 F.3d at 1288; see also *Lambda Optical Sols. LLC v. Alcatel Lucent USA Inc.*, Civ. A. No. 10-cv-487-RGA, 2015 WL 5734427, at *1 (D. Del. Sept. 30, 2015) (stating that a prior art printed publication is presumed enabling). “[B]oth claimed and unclaimed

materials disclosed in a [prior art] patent are presumptively enabling[.]” *In re Antor Media*, 689 F.3d at 1287; *see also Cubist Pharms., Inc. v. Hospira, Inc.*, 75 F. Supp. 3d 641, 661 & n.10 (D. Del. 2014).

92. To anticipate, a reference need not disclose more than what is required by the claims themselves. *See Iovate Health*, 586 F.3d at 1382 (holding that a reference disclosing a composition taken for a certain purpose was anticipating prior art where the claims did not require the measurement of any result achieved by administering the composition); *In re Gleave*, 560 F.3d 1331, 1335-36 (Fed. Cir. 2009) (“[E]vidence as to whether particular compounds work for their intended purpose is irrelevant to our § 102(b) analysis . . . [and] where the claims themselves do not require a particular activity, we have no call to require something more from the anticipating reference.”). “[I]n the context of a claimed method for treating a disease, a prior art reference need not disclose ‘proof of efficacy’ to anticipate the claim.” *In re Gleave*, 560 F.3d at 1335 (citation omitted); *Rasmussen v. SmithKline Beecham Corp.*, 413 F.3d 1318, 1326 (Fed. Cir. 2005) (“[P]roof of efficacy is not required in order for a reference to be enabled for purposes of anticipation.”).

93. Whether a reference “teaches away” from the claimed invention is irrelevant to an anticipation analysis. *See, e.g., Ben Venue Lab’ys*, 246 F.3d at 1378 (“A reference is no less anticipatory if, after disclosing the invention, the reference then disparages it. Thus, the question whether a reference ‘teaches away’ from the invention is inapplicable to an anticipation analysis.” (citation omitted)); *Billups-Rothenberg, Inc. v. Associated Reg’l & Univ. Pathologists, Inc.*, 642 F.3d 1031, 1038-39 (Fed Cir. 2011) (same).

94. “[I]f granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether

it also covers subject matter not in the prior art.” *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1346 (Fed. Cir. 1999).

a) Inherent Anticipation

95. Inherency arises when a limitation not expressly found in a prior art reference is necessarily present based on what the prior art reference conveys to those of ordinary skill in the art. *See Abbott Lab’ys v. Baxter Pharm. Prods., Inc.*, 471 F.3d 1363, 1368 (Fed. Cir. 2006). “Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claims limitations, it anticipates.” *Leggett & Platt, Inc. v. VUTEk, Inc.*, 537 F.3d 1349, 1354 (Fed. Cir. 2008) (citations omitted).

96. “The inherent teaching of a prior art reference is a question of fact.” *Par Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1194 (Fed. Cir. 2014) (citation and internal quotation marks omitted). The dispositive question regarding anticipation is “whether a person of ordinary skill in the art would have reasonably understood from the disclosure in a prior art reference that every element of the claims is disclosed[.]” *ModernaTx, Inc. v. Arbutus Biopharma Corp.*, 18 F.4th 1352, 1363 (Fed. Cir. 2021). “The extent of the inherent disclosure does not limit its anticipatory effect. In general, a limitation or the entire invention is inherent and in the public domain if it is the ‘natural result flowing from’ the explicit disclosure of the prior art.” *Schering*, 339 F.3d at 1379 (quoting *Eli Lilly & Co. v. Barr Labs., Inc.*, 251 F.3d 955, 970 (Fed. Cir. 2001)). To prove inherent anticipation, a party must show that, although the prior art does not explicitly disclose a feature of the invention, it “necessarily and inevitably” flows from practicing the prior art. *Schering*, 339 F.3d at 1379; *see also supra ¶ 92* (explaining that a reference need not disclose more than what is required by the claims to be anticipating prior art).

97. Newly discovered results of known processes are inherent and unpatentable. *See Ben Venue Lab'ys*, 246 F.3d at 1376.

98. There is no requirement that a POSA would have recognized the inherent disclosure *at the time of the invention*, but only that the subject matter is in fact inherent in the prior art reference. *Schering*, 339 F.3d at 1377 (rejecting the argument that inherent anticipation requires recognition by a POSA before the critical date and allowing expert testimony with respect to post-critical date clinical trials to show inherency); *see also In re Omeprazole Pat. Litig.*, 483 F.3d 1364, 1373 (Fed. Cir. 2007) (noting that although the inventors may not have recognized that a characteristic of the ingredients in the prior art method resulted in an in situ formation of a separating layer, the in situ formation was nevertheless inherent, stating “[t]he record shows formation of the in situ separating layer in the prior art even though that process was not recognized at the time. The new realization does not render that necessary prior art patentable”) (emphasis omitted); *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1343-45 (Fed. Cir. 2005) (holding that a prior art patent to an anhydrous form of a compound “inherently” anticipated the claimed hemihydrate form of the compound because practicing the process in the prior art to manufacture the anhydrous compound “inherently results in at least trace amounts of” the claimed hemihydrate even if the prior art did not discuss or recognize the hemihydrate); *Toro Co. v. Deere & Co.*, 355 F.3d 1313, 1320-21 (Fed. Cir. 2004) (“[T]he fact that a characteristic is a necessary feature or result of a prior-art embodiment (that is itself sufficiently described and enabled) is enough for inherent anticipation, even if that fact was unknown at the time of the prior invention.”); *Abbott Lab'ys v. Geneva Pharms., Inc.*, 182 F.3d 1315, 1319 (Fed. Cir. 1999) (“If a product that is offered for sale inherently possesses each of the limitations of the claims, then the invention is on sale, whether or not the parties to the transaction recognize that the product possesses the

claimed characteristics.”); *Atlas Powder*, 190 F.3d at 1348-49 (“Because ‘sufficient aeration’ was inherent in the prior art, it is irrelevant that the prior art did not recognize the key aspect of [the] alleged invention An inherent structure, composition, or function is not necessarily known.”).

99. For a prior art pharmaceutical product, whatever properties or results “naturally flow” from any use of the product are inherently disclosed. *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1378 (Fed. Cir. 2005) (claims directed to achieving certain benefits with topical skin formulation inherently anticipated by prior art skin cream, because “the particular benefits” associated with topical skin application “naturally flow from those methods even if not recognized as benefits”); *King Pharms.*, 616 F.3d at 1274-77 (prior art disclosure where drug was taken with food anticipated later claims to a formulation with increased drug bioavailability). New uses for a known compound are inherent when the use and method are disclosed even if the results are published after the priority date. *See In re Montgomery*, 677 F.3d 1375, 1381-83 (Fed. Cir. 2012) (finding that a clinical trial protocol for the administration of a drug anticipated a method of treatment claim even though the results were not published until after the priority date).

b) Public Use Bar

100. A claimed invention is anticipated if it was in public use before the effective filing date, otherwise known as the public use bar. *See* 35 U.S.C. § 102(a)(1). The public use bar is triggered where, prior to the critical date, the invention was both (1) in public use, and (2) ready for patenting. *See, e.g., Ingenico Inc. v. IOENGINE, LLC*, Civ. A. No. 18-826-WCB, 2022 WL 20814960, at *4-6 (D. Del. Dec. 9, 2022); *Minerva Surgical, Inc. v. Hologic, Inc.*, 550 F. Supp. 3d 158, 167 (D. Del. 2021), *aff’d*, 59 F.4th 1371 (Fed. Cir. 2023).

101. An invention is considered “in public use” when the invention is used by a person who is not under any limitation, restriction, or obligation of secrecy to the inventor. *See In re*

Smith, 714 F.2d 1127, 1134 (Fed. Cir. 1983). In determining whether the invention was in public use, courts evaluate whether the purported use was (1) accessible to the public or (2) commercially exploited. *See, e.g., Ingenico*, 2022 WL 20814960, at *4-6. A patent challenger need not prove both accessible to the public and commercially exploited.

102. To assess whether a use is accessible to the public, courts consider factors such as the nature of the activity, the extent of public access or awareness, and whether confidentiality obligations—formal or informal—were in place. *See, e.g., Dey, L.P. v. Sunovion Pharms., Inc.*, 715 F.3d 1351, 1355-56 (Fed. Cir. 2013) (reversing summary judgment of public use where clinical trial participants were subject to usage restrictions and the investigators were bound by confidentiality agreements); *MSM Invs. Co. v. Carolwood Corp.*, 259 F.3d 1335, 1337-38 (Fed. Cir. 2001) (affirming summary judgment of invalidity due to prior use of the claimed invention by a physician’s activities in a clinic whereby the physician treated patients with the claimed invention, the patients were informed of and educated about their treatment, there were no confidentiality obligations imposed on the physician or patients, and the physician’s use of the claimed invention was not experimental). In assessing public accessibility, courts have treated press releases, websites, and advertisements, as appropriate circumstantial evidence of public use. *See, e.g., Ingenico*, 2022 WL 20814960, at *6 (considering, among other evidence, evidence that the product was marketed broadly to the public, company issued press releases, the software’s availability for download, and testimony about how the user manual reflected how the product actually functioned to support a finding of public use); *Finjan, Inc. v. Symantec Corp.*, No. 10-cv-593, 2013 WL 5302560, at *6-7 (D. Del. Sept. 19, 2013) (considering, among other evidence, user manuals and press releases that supported a finding of public use), *aff’d*, 577 F. App’x 999 (Fed. Cir. 2014). A formal confidentiality agreement is not required; rather, courts consider if

circumstances created an expectation of secrecy. *Dey*, 715 F.3d at 1357.

103. Courts have found commercial exploitation where the invention was used in the ordinary course of business or sold to the public without restrictions on use or disclosure. *See, e.g., Ingenico*, 2022 WL 20814960, at *4-6 (finding public use where a third party commercially exploited a device embodying the asserted claims by selling hundreds of units before the critical date, issued press releases promoting the product's availability and features, made claimed features publicly available for download, and provided user manuals and documentation describing the device's functionality—all with any confidentiality restrictions); *Egbert v. Lippmann*, 104 U.S. 333, 334-38 (1881) (finding public use where the inventor permitted a friend to wear the invention under her clothing in public without any confidentiality restrictions, despite lack of public visibility); *Elec. Storage Battery Co. v. Shimadzu*, 307 U.S. 5, 19-20 (1939) (holding that a process used continuously in a factory setting for commercial production was a public use, even where the public had no direct view of the process).

104. An invention is considered “ready for patenting” when, prior to the critical date, it has either been reduced to practice or sufficiently disclosed such that a person of ordinary skill in the art would be able to practice the invention. *See Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67-68 (1998).

105. Reduction to practice requires that (1) the inventor had possession of the invention and (2) it was shown to work for its intended purpose. *See Minerva Surgical, Inc. v. Hologic, Inc.*, 59 F.4th 1371, 1377-78 (Fed. Cir. 2023) (holding that the inventor was in possession of the invention by creating working prototypes that embodies the claims and that evidence of studies, along with documents describing the prototypes, demonstrated that it worked for its intended purpose); *Helsinn Healthcare S.A. v. Teva Pharms. USA, Inc.*, 855 F.3d 1356, 1372-73 (Fed. Cir.

2017) (finding reduction to practice where the claimed formulation had been developed and determined to be effective based a study report demonstrating the effectiveness of a drug, internal meeting minutes acknowledging effective doses observed in a Phase II clinical study, proposed Phase III protocols submitted to the FDA stating that the Phase II studies suggest the drug's safety and efficacy, press release statement that the Phase II study demonstrated efficacy, statements by the inventors during prosecution indicating that the invention had been completed years before the critical date, and statements by the inventors in another related patent application that they conceived the invention at issue and reduced it to practice before the critical date). Formal regulatory approval or confirmation of clinical efficacy is not required to demonstrate that an invention works for its intended purpose. *See id.* at 1365-66 (further holding that the invention was ready for patenting before the critical date because the claimed formulation had already been developed and included in a commercial agreement, and explaining that proof of reduction to practice did not require FDA approval or regulatory confirmation of efficacy, as the formulation's existence—not its clinical performance—was the relevant issue).

106. Absent a showing that the invention was reduced to practice, a party may also demonstrate that the invention was sufficiently disclosed such that a POSA could practice it. *See Pfaff*, 525 U.S. at 67-68; *Hamilton Beach Brands, Inc. v. Sunbeam Prods., Inc.*, 726 F.3d 1370, 1377-78 (Fed. Cir. 2013) (detailed drawings and specific descriptions of the invention, which contained all limitations of the asserted patent, presented at meetings were sufficient to enable a POSA to practice the invention); *Weatherchem Corp. v. J.L. Clark, Inc.*, 163 F.3d 1326, 1332-34 (Fed. Cir. 1998) (drawings and samples of the claimed invention were sufficiently definite to enable a POSA to practice the invention).

c) On-Sale Bar

107. A claimed invention is anticipated if it was on sale before the effective filing date, otherwise known as the on-sale bar. *See 35 U.S.C. § 102(a)(1).* The on-sale bar applies if, prior to the critical date, the claimed invention was both (1) the subject of a commercial offer for sale, and (2) ready for patenting. *See Helsinn Healthcare S.A. v. Teva Pharms. USA, Inc.*, 586 U.S. 123, 130-31 (2019) (citing *Pfaff*, 525 U.S. at 67). A claimed invention is “the subject of a commercial offer for sale” if there is a commercial offer for sale and the offer is for the patented invention. *See Scaltech, Inc. v. Retec/Tetra, LLC*, 269 F.3d 1321, 1328 (Fed. Cir. 2001) (citation omitted).

108. To determine whether an offer or sale qualifies as a “commercial offer for sale” under the on-sale bar, Courts apply traditional contract law principles and assess whether the conduct would be understood in the commercial community as an offer that could be accepted to form a binding agreement. *See Helsinn Healthcare S.A. v. Teva Pharms. USA, Inc.*, 855 F.3d 1356, 1364-65 (Fed. Cir. 2017) (finding a commercial offer where the patentee entered into a supply and purchase agreement with a distributor that contained specific terms including price, method of payment, and method of delivery), *aff’d*, 586 U.S. 123 (2019); *Scaltech*, 269 F.3d at 1328 (holding that a proposal with sufficiently definite terms regarding services to be performed constituted a commercial offer).

109. The on-sale bar is not limited to end-user transactions; it may be triggered by a commercial offer or sale to intermediaries, including distributors. *See In re Caveney*, 761 F.2d 671, 676 (Fed. Cir. 1985) (on-sale bar applied where a third party sent samples of the invention—which inherently met all claim limitations—to a distributor who placed an order for the invention).

110. The on-sale bar applies so long as the invention that was offered for sale embodied the claimed invention, regardless of whether the parties to the transaction recognized that fact at the time. A product or process that inherently meets all the limitations of a claim can invalidate that claim, even if the seller was unaware that the invention was present. *See, e.g., Geneva Pharms.*, 182 F.3d at 1319 (holding that the on-sale bar applied where the compound offered for sale inherently satisfied the claim limitations, despite the seller's failure to appreciate the full scope of the invention at the time of the transaction); *Scaltech*, 269 F.3d at 1330-31 (finding the claimed process was on sale even though the seller did not recognize that it possessed the features later claimed).

111. What matters is not whether the invention was fully understood at the time of the sale, but whether the sale relates to a product or method that embodies the claimed invention. *See Geneva Pharms.*, 182 F.3d at 1319.

112. The “ready for patenting” test is the same for both the on-sale bar and the public use bar. *See ART+Com Innovationpool GmbH v. Google Inc.*, Civ. A. No. 1:14-217-TBD, 2016 WL 9954312, at *9 (D. Del. Sept. 9, 2016), *aff'd sub nom., Art+Com Innovationpool GmbH v. Google LLC*, 712 F. App'x 976 (Fed. Cir. 2017); *see also supra* Paragraphs 53-55.

d) Experimental Use Exception to Public Use and On Sale Bars

113. Experimental use may negate public use or on-sale invalidation. The experimental use exception only concerns the actions of the inventors and their agents, not a third-party. *See Atlanta Attachment Co. v. Leggett & Platt, Inc.*, 516 F.3d 1361, 1366 (Fed. Cir. 2008) (a third party's experimentation conducted to determine whether the invention would suit a particular purpose does not fall under the experimental use exception because the exception only concerns the actions of the inventors, and the inventor did not exercise control over the alleged testing). The

experimental use exception does not apply if it is shown that the invention was ready for patenting.

Clock Spring, L.P. v. Wrapmaster, Inc., 560 F.3d 1317, 1327-28 (Fed. Cir. 2009) (holding that the experimental use exception did not apply where the reports relied upon by the patentee showed that the testing was conducted solely to gain acceptance by regulators and the industry and did not involve systematic testing to evaluate whether the invention worked for its intended purpose).

114. A named inventor's use may be experimental if its purpose is (1) to test claimed features of the invention, or (2) to determine whether the invention will work for its intended purpose. *See Energy Heating, LLC v. Heat On-The-Fly, LLC*, 889 F.3d 1291, 1300-01 (Fed. Cir. 2018) (holding that the experimental use exception did not apply because the alleged inventor admitted to using the invention before the critical date, uses of the invention were not done in secret, no attempts to enter confidentiality agreements, and no notebooks, drawings, or plans presented to demonstrate the use was experimental). Various factors are considered in determining whether the use was experimental, including, "(1) the necessity for public testing, (2) the amount of control over the experiment retained by the inventor, (3) the nature of the invention, (4) the length of the test period, (5) whether payment was made, (6) whether there was a secrecy obligation, (7) whether records of the experiment were kept, (8) who conducted the experiment, (9) the degree of commercial exploitation during testing, (10) whether the invention reasonably requires evaluation under actual conditions of use, (11) whether testing was systematically performed, (12) whether the inventor continually monitored the invention during testing, and (13) the nature of contacts made with potential customers." *See id.* at 1301.

6. Obviousness

a) General Principles

115. Section 103 of the Patent Act provides:

A patent for a claimed invention may not be obtained . . . if the differences

between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.

35 U.S.C. § 103; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (“the results of ordinary innovation are not the subject of exclusive rights under the patent laws”). Where the patent is directed to a new treatment using a known compound, it is reasonable to assume that compounds with shared common properties are apt to share other related properties as well. *Anacor Pharm., Inc v. Iancu*, 889 F.3d 1372, 1384 (Fed. Cir. 2018).

116. “Obviousness is a question of law, supported by underlying fact questions.” *Valeant Pharm. Int'l, Inc. v. Mylan Pharm. Inc.*, 955 F.3d 25, 28 (Fed. Cir. 2020). The underlying factual considerations include: (1) the scope and content of the prior art, (2) the level of ordinary skill in the pertinent art, (3) the differences between the prior art and the claims at issue, and (4) secondary considerations. *Prometheus Lab'ys, Inc. v. Roxane Lab'ys, Inc.*, 805 F.3d 1092, 1097-98 (Fed. Cir. 2015); *see also Bayer Schering Pharma AG v. Barr Lab'ys, Inc.*, 575 F.3d 1341, 1346-47 (Fed. Cir. 2009). Based on these factual inquiries, the Court must determine, as a matter of law, whether or not the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art at the time of the effective filing date of the claimed invention. *See SNIPR Techs. Ltd. v. Rockefeller Univ.*, 72 F.4th 1372, 1375 (Fed. Cir. 2023); *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966); *KSR*, 550 U.S. at 406. The clear and convincing evidence standard for obviousness does not apply to the “ultimate legal conclusion of obviousness itself,” but only to the disputed facts underlying the conclusion of obviousness. *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 767 (Fed. Cir. 1988).

117. The Supreme Court has “set forth an expansive and flexible approach” to obviousness. *KSR*, 550 U.S. at 415-18. This flexible standard expands the obviousness analysis

beyond just “published articles and the explicit content of issued patents[,]” as a court “need not seek out precise teachings directed to the specific subject matter of the challenged claim[.]” *Id.* at 418-19. Instead, a court “can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 418. In determining what would have been obvious to a POSA, Courts have cautioned against the use of hindsight and ex-post reasoning. *See id.* at 421.

118. “[I]nherency may supply a missing claim limitation in an obviousness analysis.” *Par Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1194-95 (Fed. Cir. 2014). An element is inherent for purposes of the obviousness analysis “when the limitation at issue is the ‘natural result’ of the combination of prior art elements.” *Id.* at 1195 (citation omitted); *see also In re Huai-Hung Kao*, 639 F.3d 1057, 1070 (Fed. Cir. 2011) (finding that a “claimed ‘food effect’ [wa]s an inherent property” of the formulation covered by the asserted patent such that the claim element “add[ed] nothing of patentable consequence[,]” and affirming obviousness where prior art reference did not teach the inherent element); *In re Kubin*, 561 F.3d 1351, 1357 (Fed. Cir. 2009) (“Even if no prior art of record explicitly discusses the [limitation], the . . . application itself instructs that [the limitation] is not an additional requirement imposed by the claims on the [claimed invention], but rather a property necessarily present in [the claimed invention].”). Further, “[i]t is long settled that in the context of obviousness, the ‘mere recitation of a newly discovered function or property, inherently possessed by things in the prior art, does not distinguish a claim drawn to those things from the prior art.’” *Persönion Pharms. LLC v. Alvogen Malta Operations Ltd.*, 945 F.3d 1184, 1190 (Fed. Cir. 2019) (quoting *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981)).

119. Obviousness is evaluated from the perspective of a POSA, a hypothetical person who is presumed to know all the teachings of the prior art references in the field of the invention

at the time the invention was made. *See Union Carbide Corp. v. Am. Can Co.*, 724 F.2d 1567, 1575-76 (Fed. Cir. 1984).

120. “[I]n many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *KSR*, 550 U.S. at 420; *see also Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161-62 (Fed. Cir. 2007). A POSA also understands and considers the “design incentives and other market forces” in the relevant field that would prompt one to seek variations of known techniques. *KSR*, 550 U.S. at 417. Additionally, a POSA can “fill in the gap when limitations of the claimed invention are not specifically found in the prior art.” *Belden Techs. Inc. v. Superior Essex Commc’ns LP*, 802 F. Supp. 2d 555, 563 (D. Del. 2011); *see also Randall Mfg. v. Rea*, 733 F.3d 1355, 1362-63 (Fed. Cir. 2013).

b) Scope and Content of the Prior Art

121. The scope of the prior art includes art that is “reasonably pertinent to the particular problem with which the inventor was involved.” *In re GPAC Inc.*, 57 F.3d 1573, 1577 (Fed. Cir. 1995) (citations omitted). In determining whether the claimed invention falls within the scope of the relevant prior art, a court first examines “the field of the inventor’s endeavor” and “the particular problem with which the inventor was involved” at the time of invention. *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1339 (Fed. Cir. 2005) (citation omitted). “A reference is reasonably pertinent if, even though it may be in a different field of endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem.” *Id.*

122. A prior art reference in an obviousness analysis must be considered as a whole and not limited to the particular invention it describes. *See, e.g., Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1076 (Fed. Cir. 2015) (quoting *EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d 898,

907 (Fed. Cir. 1985) for the proposition that “[a] reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect” (emphasis added)). This is true even if a particular embodiment of the invention is not the preferred embodiment. *See, e.g., In re Arora*, 369 F. App’x 120, 122 (Fed. Cir. 2010) (“[Appellant] argues that [prior art reference] should be understood as limited to the narrow teaching that a smaller amount of a drug is needed when delivered via [prior art reference’s] inventive dry powder inhaler instead of a metered dose inhaler. It is well-settled, however, that a prior art reference must be considered for all that it teaches to those of ordinary skill in the art, not just the embodiments disclosed therein. [Prior art reference] teaches the broad principle that different drugs are equipotent at different dosages, and even provides an example of that principle.” (citations omitted)); *Purdue Pharma Prods. L.P. v. Par Pharm., Inc.*, 377 F. App’x 978, 982 (Fed. Cir. 2010) (“[Prior art reference] itself renders the selection of tramadol obvious regardless whether or not the patent lists tramadol as a preferred embodiment.” (citation omitted)).

123. “What a reference teaches a person of ordinary skill is not . . . limited to what a reference specifically ‘talks about’ or what is specifically ‘mentioned’ or ‘written’ in the reference.” *Syntex (U.S.A.) LLC v. Apotex, Inc.*, 407 F.3d 1371, 1380 (Fed. Cir. 2005). Rather, prior art references may be combined with the knowledge and/or experience of a skilled person. *See Randall Mfg.*, 733 F.3d at 1362-63 (“[T]he knowledge of such an artisan is part of the store of public knowledge that must be consulted when considering whether a claimed invention would have been obvious.”).

124. Even “[a] non-enabling reference may qualify as prior art for the purpose of determining obviousness,” *ABT Sys., LLC v. Emerson Elec. Co.*, 797 F.3d 1350, 1360 n.2 (Fed. Cir. 2015) (quoting *Symbol Techs., Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1578 (Fed. Cir. 1991)),

“and even ‘an inoperative device . . . is prior art for all that it teaches[.]’” *ABT Sys.*, 797 F.3d at 1360 n.2 (citation omitted); *see also Antor Media*, 689 F.3d at 1292.

c) Differences Between the Claimed Invention and the Prior Art

125. In determining the differences between the claimed invention and the prior art, obviousness is judged under “an expansive and flexible approach” driven by “common sense.” *KSR*, 550 U.S. at 415, 420; *see also Senju Pharm. Co. v. Apotex Inc.*, 836 F. Supp. 2d 196, 208 (D. Del. 2011) (“The Supreme Court has emphasized the need for courts to value ‘common sense’ over ‘rigid preventative rules’[.]”). In making this determination, the Court must consider both the claimed invention and the prior art as a whole in light of the Court’s construction of the claims at issue. *See In re O’Farrell*, 853 F.2d 894, 902 (Fed. Cir. 1988); *see also* 35 U.S.C. § 103.

126. A patent that merely combines “familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 416; *Q.I. Press Controls, B.V. v. Lee*, 752 F.3d 1371, 1379 (Fed. Cir. 2014) (same). This is because “[g]ranting patent protection to advances that would occur in the ordinary course without real innovation retards progress and may, in the case of patents combining previously known elements, deprive prior inventions of their value or utility.” *KSR*, 550 U.S. at 419. “One of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *Id.* at 419-20; *see also Norgren Inc. v. Int’l Trade Comm’n*, 699 F.3d 1317, 1324-27 (Fed. Cir. 2012) (affirming invalidity of claims under § 103 where the claimed invention solved known problems by the use of an obvious solution). Moreover, “when a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no

more than one would expect from such an arrangement, the combination is obvious.” *KSR*, 550 U.S. at 417 (citation omitted).

127. A claim is obvious if it requires no more than “routine optimization” of techniques taught by the prior art. *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1367-68, 1371 (Fed. Cir. 2007) (finding claims obvious when they required “nothing more than routine optimization that would have been obvious to one of ordinary skill in the art”); *Genzyme Therapeutic Prods. L.P. v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1365, 1373 (Fed. Cir. 2016) (affirming decision finding that “the claimed dosing schedule would have been arrived at by routine optimization”); *see also Hoffmann-La Roche Inc. v. Apotex Inc.*, 748 F.3d 1326, 1329-31 (Fed. Cir. 2014) (affirming decision finding dosing claims obvious because “[a] relatively infrequent dosing schedule has long been viewed as a potential solution to the problem of patient compliance”); *see also Merck & Co., Inc. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1373 (Fed. Cir. 2005) (reversing decision to find claims obvious that covered slightly different dosages from those of the prior art). Further, where a person of ordinary skill in the art simply pursues “known options” from a “finite number of identified, predictable solutions,” the claimed solution is obvious under § 103. *KSR*, 550 U.S. at 402, 421.

128. “Where a claimed range overlaps with a range disclosed in the prior art, there is a presumption of obviousness.” *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311 (Fed. Cir. 2006) (citing *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1322 (Fed. Cir. 2004)); *see also E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1008 (Fed. Cir. 2018) (“[I]n the absence of evidence indicating that there is something special or critical about the claimed range, an overlap suffices to show that the claimed range was disclosed in—and therefore obvious in light of—the prior art.”); *Dr. Reddy’s Lab’ys, Inc. v. Horizon Pharma USA, Inc.*, No.

IPR2018-00272, 2019 WL 4239619, at *13 (P.T.A.B. Sept. 6, 2019) (“Administration of a unit dosage form of naproxen and esomeprazole twice daily, in the AM and PM, is a predictable variation on the ’285 patent’s teaching of twice daily dosing of naproxen. A skilled artisan would have seen a benefit in twice daily dosing of the unit dosage form in terms of patient compliance with a medication schedule, ease of use, lack of confusion, and minimizing different medications to be taken. On the facts before us, a preponderance of the evidence supports the obviousness of twice daily dosing of a unit dosage form of esomeprazole and naproxen.” (citations omitted)). The presumption of obviousness can be rebutted only if it is shown that the prior art teaches away from the claimed range or the claimed range produces new and unexpected results. See *Ormco*, 463 F.3d at 1311 (citing *Iron Grip*, 392 F.3d at 1322); *Dr. Reddy’s Lab’ys*, 2019 WL 4239619, at *12 (finding that “although Patent Owners argue that the claimed pharmacokinetic parameters are surprising and unexpected, Patent Owners produce no evidence of any criticality in the amounts of esomeprazole and naproxen claimed in comparison to the dosages disclosed in the ’285 patent”).

d) Motivation to Combine Prior Art

129. “For obviousness, a single reference need not disclose every element of the claimed invention.” *Hospira, Inc. v. Amneal Pharms., LLC*, 285 F. Supp. 3d 776, 792 (D. Del. 2018) (citing *Pfizer*, 480 F.3d at 1361). Rather, a conclusion of obviousness may be based on either a single reference or a combination of prior art references. See *Senju*, 836 F. Supp. 2d at 208 (“[A] defendant asserting obviousness in view of a combination of references has the burden to show that a person of ordinary skill in the relevant field had a reason to combine the elements in the manner claimed.”); *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“We see no clear error in the Board’s determination as to the teachings of the prior art references, in combination.”).

130. When obviousness is based on a combination of prior art references, a patent challenger must demonstrate “that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention[.]” *Pfizer*, 480 F.3d at 1361. A motivation to combine may be found “explicitly or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)).

131. The Supreme Court has held that the Federal Circuit’s requirement for some “teaching, suggestion, or motivation” in the art to combine references forming the basis for an obviousness contention was too rigid and propounded an “expansive and flexible approach” based on the principles set forth in *Graham*. *KSR*, 550 U.S. at 407, 415 (citation omitted). “In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls.” *Id.* at 419; *see also In re Beattie*, 974 F.2d 1309, 1311-12 (Fed. Cir. 1992). “The question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art.” *KSR*, 550 U.S. at 420. “Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.*; *see also Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009) (“We therefore hold that . . . an analysis of obviousness . . . may include recourse to logic, judgment, and common sense available to the person of ordinary skill that do not necessarily require explication in any reference or expert opinion.”). Further,

“[o]ne of ordinary skill in the art need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (citation omitted).

132. Even if a reference does not constitute prior art, a court may consider it as motivation to combine. *See, e.g., Nat'l Steel Car, Ltd. v. Canadian Pac. Ry., Ltd.*, 357 F.3d 1319, 1337-38 (Fed. Cir. 2004).

e) Reasonable Expectation of Success

133. A “patent challenger [must] prove that the skilled artisan would have had a reasonable expectation of successfully achieving the claimed invention from the combination [of prior art].” *Eli Lilly & Co. v. Teva Pharmas. Int'l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021); *see also Hoffman-La Roche Inc. v. Apotex Inc.*, 748 F.3d 1326, 1331 (Fed. Cir. 2014) (“Conclusive proof of efficacy is not necessary to show obviousness. All that is required is a reasonable expectation of success.”); *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (“Obviousness does not require absolute predictability of success”; rather, “[a]ll that is required is a reasonable expectation of success” in making the claimed invention (alteration in original; citation omitted)); *Duramed Pharmas., Inc. v. Watson Lab'ys, Inc.*, 413 F. App'x 289, 294 (Fed. Cir. 2011) (“[T]here is no requirement that a teaching in the prior art be scientifically tested, or even guarantee success, before providing a reason to combine. Rather, it is sufficient that one of ordinary skill in the art would perceive from the prior art a reasonable likelihood of success.” (citations omitted)); *Acorda Therapeutics, Inc. v. Roxane Lab'ys, Inc.*, No. 14-882-LPS, 2017 WL 1199767, at *23 (D. Del. Mar. 31, 2017) (“[A] POSA need only have a ‘reasonable expectation of success in developing [the claimed invention].’” (quoting *Allergan, Inc. v. Sandoz, Inc.*, 725 F.3d 1286, 1292 (Fed. Cir. 2013))), *aff'd in part, dismissed in part*, 903 F.3d 1310 (Fed. Cir. 2018).

“[O]bviousness cannot be avoided simply by a showing of some degree of unpredictability in the art so long as there was a reasonable probability of success.” *Pfizer*, 480 F.3d at 1364; *see also Medichem*, 437 F.3d at 1165 (“While the definition of ‘reasonable expectation’ is somewhat vague, [Federal Circuit] case law makes clear that it does not require a *certainty* of success.”). Moreover, because scientific certainty is not required, a Phase III clinical trial, or FDA approval, is not required for a POSA to have a reasonable expectation of success. *Acorda Therapeutics, Inc. v. Roxane Lab’ys, Inc.*, 903 F.3d 1310, 1333-34 (Fed. Cir. 2018) (“expert and other evidence indicates that a person of skill in the present context *can* draw reasonable inferences about the likelihood of success even without a perfectly designed clinical trial showing a statistically significant difference in efficacy between a specific dose and placebo”); *Persinon Pharms.*, 945 F.3d at 1190 (“[t]he standard to find a motivation to combine is far below what is sufficient to prove safety and efficacy to the FDA,” and therefore, “[t]he fact that the FDA found the comparison [between Vicoprofen and Zohydro ER] insufficient to satisfy its safety and efficacy standards does not speak to the issue of obviousness.”) (citation omitted); *Salix Pharms., Ltd. v. Norwich Pharms. Inc.*, 98 F.4th 1056, 1062-64 (Fed. Cir. 2024) (affirming district court’s holding that the claims at issue were invalid as obvious, explaining that a POSA reviewing a clinical trial protocol and a journal article would have been motivated to combine the references and would have had a reasonable expectation of success in administering the claimed dosage).

134. Requiring testing for every possible configuration or combination in the prior art “improperly equates a reasonable expectation with absolute certainty.” *Hospira*, 285 F. Supp. 3d at 794 (citation omitted). None of “the length, expense, [or] difficulty of the techniques used are dispositive since many techniques that require extensive time, money, and effort to carry out may nevertheless be arguably ‘routine’ to one of ordinary skill in the art.” *Pfizer*, 480 F.3d at 1367.

135. Where “there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.” *KSR*, 550 U.S. at 421. “If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.” *Id.* In such instances, “the fact that a combination was obvious to try might show that it was obvious under § 103.” *Id.*

136. Where a claim limitation is inherent in the prior art, “there is no question of a reasonable expectation of success in achieving it.” *Hospira, Inc. v. Fresenius Kabi USA, LLC*, 946 F.3d 1322, 1332 (Fed. Cir. 2020); *see also Cytiva BioProcess R&D AB v. JSR Corp.*, 122 F.4th 876, 889-90 (Fed. Cir. 2024) (an analysis to demonstrate whether a POSA would have a reasonable expectation of success is not necessary when the claimed limitations merely recite an inherent property of an otherwise obvious combination of the disclosures of the prior art); *Galderma Lab'ys, L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013) (“[W]here there is a range disclosed in the prior art, and the claimed invention falls within that range, the burden of production falls upon the patentee to come forward with evidence that (1) the prior art taught away from the claimed invention; (2) there were new and unexpected results relative to the prior art; or (3) there are other pertinent secondary considerations.”); *E.I. DuPont*, 904 F.3d at 1006 (“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” (citations omitted)).

f) Secondary Considerations

137. As part of the obviousness analysis, a court may consider secondary considerations of nonobviousness, also referred to as objective indicia of nonobviousness. *See KSR*, 550 U.S. at 406. The purpose of secondary considerations is to “check against hindsight bias.” *Bristol-Myers*

Squibb Co. v. Teva Pharm. USA, Inc., 752 F.3d 967, 977 (Fed. Cir. 2014) (citation omitted); *see also Alza Corp. v. Mylan Lab'ys, Inc.*, 464 F.3d 1286, 1290 (Fed. Cir. 2006) (explaining that secondary considerations guard against hindsight). Secondary considerations of nonobviousness “can include evidence of commercial success, long felt but unsolved needs, and failure of others, as well as unexpected results created by the claimed invention, unexpected properties of the claimed invention, licenses showing industry respect for the invention, and skepticism of skilled artisans before the invention.” *Aventis Pharma S.A. v. Hospira, Inc.*, 743 F. Supp. 2d 305, 344 (D. Del. 2010) (citations omitted); *see also Imperial Chem.*, 777 F. Supp. at 372 & n.91. “In some rare instances, the secondary consideration of simultaneous invention might also supply indicia of obviousness.” *Geo M. Martin Co. v. Alliance Mach. Sys. Int'l LLC*, 618 F.3d 1294, 1304 (Fed. Cir. 2010). “Independently made, simultaneous inventions, made within a comparatively short space of time, are persuasive evidence that the claimed apparatus was the product only of ordinary mechanical or engineering skill.” *Id.* at 1305.

138. UTC bears the burden of production with respect to evidence of any alleged secondary considerations of nonobviousness. *Novo Nordisk A/S v. Caraco Pharm. Lab'ys, Ltd.*, 719 F.3d 1346, 1354 (Fed. Cir. 2013) (discussing that the burden of production shifts to the patentee “once the court determine[s] that the challenger has established a prima facie case of obviousness”). In other words, the patentee must present evidence to support a finding that a given secondary consideration exists. *See, e.g., Hospira*, 285 F. Supp. 3d at 784 (citing *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016)); *Prometheus*, 805 F.3d at 1101-02.

139. Even if secondary considerations exist, they cannot overcome a strong prima facie showing of obviousness. *See, e.g., Agrizap, Inc. v. Woodstream Corp.*, 520 F.3d 1337, 1344 (Fed. Cir. 2008); *Ohio Willow Wood Co. v. Alps S., LLC*, 735 F.3d 1333, 1344 (Fed. Cir. 2013)

(“[W]here a claimed invention represents no more than the predictable use of prior art elements according to established functions, . . . evidence of secondary indicia are frequently deemed inadequate to establish non-obviousness.”); *Leapfrog*, 485 F.3d at 1162 (“[G]iven the strength of the prima facie obviousness showing, the evidence on secondary considerations was inadequate to overcome a final conclusion that [the claim] would have been obvious.”); *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1371 (Fed. Cir. 2006) (“[S]econdary considerations of nonobviousness are insufficient as a matter of law to overcome our conclusion that the . . . claim [at issue] would have been obvious.”); *Richardson-Vicks Inc. v. Upjohn Co.*, 122 F.3d 1476, 1484 (Fed. Cir. 1997); *Bristol-Myers Squibb Co. v. Teva Pharmas. USA, Inc.*, 923 F. Supp. 2d 602, 686 (D. Del. 2013) (concluding that the totality of the secondary considerations evidence “did not strongly persuade the Court as to [the invention’s] nonobviousness”).

140. “A blocking patent diminishes possible rewards from a non-owner’s or non-licensee’s investment activity aimed at an invention whose commercial exploitation would be infringing, therefore reducing incentives for innovations in the blocked space by non-owners and non-licensees of the blocking patent.” *Acorda Therapeutics*, 903 F.3d at 1339. Thus, the existence of a blocking patent may reduce the weight given to secondary considerations. *See Galderma*, 737 F.3d at 740-41 (affirming obviousness when the evidence of commercial success was “of minimal probative value” because patents owned by patentee may have “blocked” competition in the market) (citation and internal quotation marks omitted); *see also Merck & Co.*, 395 F.3d at 1377 (where “market entry by others was precluded [due to blocking patents], the inference of non-obviousness of [the asserted claims], from evidence of commercial success, is weak”).

(1) Nexus

141. “For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the *claimed invention*. Where the offered secondary consideration actually results from something other than what is both claimed and *novel* in the claim, there is no nexus to the merits of the claimed invention.” *In re Huai-Hung Kao*, 639 F.3d at 1068 (citations omitted); *see also In re GPAC*, 57 F.3d at 1580; *Novartis AG v. Torrent Pharms. Ltd.*, 853 F.3d 1316, 1330 (Fed. Cir. 2017). Nexus must be established through specific evidence. *See In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (confirming that party asserting secondary considerations “must submit some factual evidence that demonstrates the nexus”). However, even “impressive” evidence of secondary considerations is not “entitled to weight” unless “it is relevant to the claims at issue[.]” *In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994). The patentee may establish nexus by showing “a legally and factually sufficient connection between the evidence and the patented invention.” *See Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (citation and internal quotation marks omitted).

142. Courts routinely exclude evidence of secondary considerations absent a showing of nexus. *See, e.g., Inventio AG v. Thyssenkrupp Elevator Corp.*, No. 08-00874-RGA, 2014 WL 5786668, at *8 (D. Del. Nov. 6, 2014) (evidence of secondary considerations properly excluded where plaintiff failed to show nexus to claimed invention), *aff’d*, 622 F. App’x 906 (Fed. Cir. 2015).

143. “[W]hen the thing that is commercially successful is not coextensive with the patented invention—for example, if the patented invention is only a component of a commercially successful machine or process—the patentee must show *prima facie* a legally sufficient

relationship between that which is patented and that which is sold.”” *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (citation omitted). A presumption of nexus can therefore be rebutted by evidence that the secondary consideration was due to extraneous factors other than the patented invention, such as unclaimed features, features in the prior art, and/or external factors (e.g., marketing efforts, blocking patents, regulatory exclusivity). *Id.*; see also, e.g., *Hospira*, 285 F. Supp. 3d at 797-98; *Geo. M. Martin Co.*, 618 F.3d at 1304.

144. The proffered evidence of secondary considerations must also be “commensurate in scope” with the asserted claims. *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1336 (Fed. Cir. 2010) (citation omitted). If evidence of secondary considerations relates to a narrow aspect of a much broader claim, such evidence is not commensurate with the scope of the claims and fails to establish nonobviousness. See *Asyst Techs., Inc. v. Emtrak, Inc.*, 544 F.3d 1310, 1316 (Fed. Cir. 2008); *In re Peterson*, 315 F.3d 1325, 1331 (Fed. Cir. 2003) (affirming finding that unexpected results commensurate in scope with claimed range of 1-3% were not shown where unexpected results were only associated with 2%); *In re Dill*, 604 F.2d 1356, 1361 (C.C.P.A. 1979) (“The evidence presented to rebut a prima facie case of obviousness must be commensurate in scope with the claims to which it pertains.”). Likewise, merely “being the first commercially-available . . . treatment” does not create the requisite nexus between the patent claims and an alleged commercial embodiment thereof when the prior art disclosed that treatment. *Novartis*, 853 F.3d at 1331.

(2) Unexpected Results

145. Whether there are unexpected results is a question of fact. *In re Peterson*, 315 F.3d at 1331. To be considered as evidence of nonobviousness, “unexpected results must be established by factual evidence.” *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997). “Mere argument or

conclusory statements” by the patentee “do[] not suffice.” *Id.* (citation omitted) (supporting that speculation or unproven hypotheses about what might become an unexpected result are not enough).

146. The relevant time period for the “unexpected results” inquiry is whether the results would have been unexpected by one of ordinary skill in the art at the time of the patentee’s application and based on knowledge available at that time. *See, e.g., In re Geisler*, 116 F.3d at 1470.

147. To support a finding of unexpected results, a patentee must “show that the claimed invention exhibits some superior property or advantage that a person of ordinary skill in the relevant art would have found surprising or unexpected” compared to the closest prior art. *In re Geisler*, 116 F.3d at 1469; *see also Adapt Pharma Operations Ltd. v. Teva Pharms. USA, Inc.*, 25 F.4th 1354, 1373 (Fed. Cir. 2022) (“[E]vidence of unexpected results must establish that there is a difference between the results obtained and those of the closest prior art, and that the difference would not have been expected by one of ordinary skill in the art at the time of the invention.” (citation omitted)); *Bristol-Myers Squibb Co.*, 752 F.3d at 977 (“To be particularly probative, evidence of unexpected results must establish that there is a difference between the results obtained and those of the closest prior art, and that the difference would not have been expected by one of ordinary skill in the art at the time of the invention.”).

148. The closest prior art does not need to be the commercial standard in the industry or even commercially available. *See, e.g., Trs. of Columbia Univ. v. Illumina, Inc.*, 620 F. App’x 916, 932 (Fed. Cir. 2015) (stating that “there is no requirement that the closest prior art be commercialized”); *In re Wright*, 569 F.2d 1124, 1128 (C.C.P.A. 1977) (finding failure of a

particular reference to constitute “the commercial standard” did not undermine its position as the closest prior art).

149. To be probative in the obviousness inquiry, the supposedly unexpected result must be “different in kind and not merely in degree from the results of the prior art.” *Galderma*, 737 F.3d at 739 (citation omitted); *see also Bristol-Myers*, 752 F.3d at 977 (“Unexpected properties, however, do not necessarily guarantee that a new compound is nonobvious. While a ‘marked superiority’ in an expected property may be enough in some circumstances to render a compound patentable, a ‘mere difference in degree’ is insufficient.” (citation omitted)); *In re Aller*, 220 F.2d 454, 457-59 (C.C.P.A. 1955) (finding no evidence of unexpected results where claimed conditions allegedly contributed to roughly 20 percent improvement in yield); *E.I. DuPont*, 904 F.3d at 1011-12 (finding that evidence of alleged unexpected results was insufficient where patentee only presented evidence for one point in the claimed range and had failed to show that a 20 percent increase in yield was a difference in kind rather than a difference in degree).

150. Evidence that a drug was slightly more or less effective than the prior art would suggest it does not constitute an unexpected result for purposes of assessing obviousness. *See Acorda Therapeutics*, 2017 WL 1199767, at *39; *Galderma*, 737 F.3d at 739 (finding that “[r]esults which differ by percentages are differences in degree rather than kind”); *In re Merck & Co.*, 800 F.2d at 1098-99 (refusing to find unexpected results where alleged difference in properties “is a matter of degree rather than kind”).

151. To assert that results were unexpected, “the patent owner must first show ‘what properties were expected.’” *Aventis*, 743 F. Supp. 2d at 348 (citation omitted); *see also Pfizer*, 480 F.3d at 1371 (“[I]n order to properly evaluate whether a superior property was unexpected, the court should have considered what properties were expected.”).

152. Further, to establish unexpected results, a patentee must proffer evidence that the allegedly unexpected results actually occurred. *See In re Geisler*, 116 F.3d at 1470 (“It is well settled that unexpected results must be established by factual evidence.”). Speculation or unproven hypotheses about what might become an unexpected result are simply not enough. *See id.* (finding a statement that it was “common sense” that an effect was unexpected unpersuasive).

153. “Mere recognition of latent [i.e., intrinsic] properties in the prior art does not render nonobvious an otherwise known invention.” *In re Baxter Travenol Labs.*, 952 F.2d at 392.

154. As with other secondary considerations, even where a claimed invention “exhibits unexpectedly superior results, this secondary consideration does not overcome [a] strong showing of obviousness[.]” *Pfizer*, 480 F.3d at 1372. Where “the record establishes such a strong case of obviousness,” any “alleged unexpectedly superior results are ultimately insufficient.” *Id.* In particular, “evidence of superior [results] does nothing to undercut the showing that there was a reasonable expectation of success . . . even if the level of success may have turned out to be somewhat greater than would have been expected.” *Hoffmann-La Roche*, 748 F.3d at 1334.

(3) Skepticism of Others

155. “If industry participants or skilled artisans are skeptical about whether or how a problem could be solved or the workability of the claimed solution, it favors non-obviousness. Doubt or disbelief by skilled artisans regarding the likely success of a combination or solution weighs against the notion that one would combine elements in references to achieve the claimed invention.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1335 (Fed. Cir. 2016); *Neptune Generics, LLC v. Eli Lilly & Co.*, 921 F.3d 1372, 1377 (Fed. Cir. 2019) (“Evidence of industry skepticism is a question of fact that weighs in favor of non-obviousness.”).

(4) Failure of Others

156. Courts often view the “failure of others” inquiry as going hand-in-hand with the long-felt need inquiry. *See Adapt Pharma*, 25 F.4th at 1376-77. Failure of others in obtaining FDA approval for a product is not dispositive of failure of others. *See id.* Courts are entitled to weigh such evidence in addition to other evidence in determining the probative value of the presence or lack of FDA approval. *See id.*

157. To be a relevant secondary consideration, the cause of the failure of others must be attributable to the absence of the claimed aspects of the invention in the attempt. *See Cubist Pharms., Inc. v. Hospira, Inc.*, 805 F.3d 1112, 1126 (Fed. Cir. 2015).

(5) Long-Felt but Unmet Need

158. “Evidence of a long-felt need is only probative of nonobviousness . . . when both ‘a demand existed for the patented invention, and others tried but failed to satisfy that demand.’” *In re Copaxone Consol. Cases*, No. 14-1171-GMS, 2017 WL 401943, at *23 (D. Del. Jan. 30, 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1083 (Fed. Cir. 2012)).

159. To establish the existence of a long-felt but unmet need, the patent owner must show recognition of a problem in the relevant field for a considerable time, that the claimed invention solved the problem, and that the solution was not dependent on unrelated advances in the field. *Apple Inc. v. Samsung Elecs. Co.*, 816 F.3d 788, 804-05 (Fed. Cir. 2016), *vacated in part on other grounds on reh’g en banc*, 839 F.3d 1034 (Fed. Cir. 2016); *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1332 (Fed. Cir. 2009). In other words, the need must have been a persistent one that was recognized by those of ordinary skill in the art. *In re Gershon*, 372 F.2d 535, 538 (C.C.P.A. 1967) (“Since the alleged problem in this case was first recognized by

appellants, and others apparently have not yet become aware of its existence, it goes without saying that there could not possibly be any evidence of either a long-felt need in the . . . art for a solution to a problem of dubious existence or failure of others skilled in the art who unsuccessfully attempted to solve a problem of which they were not aware.”).

160. Analysis of a long-felt but unmet need begins “as of the date of an articulated identified problem and evidence of efforts to solve that problem.” *Perfect Web Techs.*, 587 F.3d at 1332-33 (citation omitted). And when assessing long-felt but unmet need, courts “are constrained . . . to consider whether the *claimed invention* satisfied a long felt need[.]” *Sjolund v. Musland*, 847 F.2d 1573, 1582 (Fed. Cir. 1988) (emphasis in original). As such, advantages to claimed inventions that are unclaimed are “irrelevant in terms of the obviousness analysis.” *Id.* (citing *In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1577 (Fed. Cir. 1985)).

161. Federal Circuit precedent “requires that the applicant submit actual evidence of long-felt need, as opposed to argument.” *See In re Kahn*, 441 F.3d at 990. It is not enough for a patentee to identify drawbacks; the patentee must “show that these drawbacks constituted a long-felt, unmet need alleviated by the patent.” *Perfect Web Techs.*, 587 F.3d at 1332; *see also In re Gardner*, 449 F. App’x 914, 918 (Fed. Cir. 2011) (“[O]nce a long-felt need is established, evidence must show that the claimed invention satisfied that need.”) (citing *In re Cavanagh*, 436 F.2d 491, 496 (C.C.P.A. 1971)); *In re Kahn*, 441 F.3d at 990-91. “Evidence of the long-felt need factor must squarely address the need satisfied by the asserted claims themselves.” *AstraZeneca LP v. Breath Ltd.*, 88 F. Supp. 3d 326, 387 (D.N.J. 2015), *aff’d*, 603 F. App’x 999 (Fed. Cir. 2015). A long-felt but unmet need must be “sufficiently connected with the novel elements of the asserted claims.” *Merck & Cie v. Gnosis S.P.A.*, 808 F.3d 829, 838 (Fed. Cir. 2015). Even if the patentee introduces evidence of a long-felt need ostensibly tied to the patent claims, where the differences between the

prior art and the claimed invention are minimal, “it cannot be said that any long-felt need was unsolved.” *Geo. M. Martin Co.*, 618 F.3d at 1304.

162. Bare assertions that a claimed invention made improvements without supporting data are not sufficient to show that the claimed invention met any long-felt need. *Perfect Web Techs.*, 587 F.3d at 1333. Thus, an assertion of long-felt need must be rejected where the patentee “provided no evidence to explain how long [any relevant] need was felt . . . when the problem first arose,” or how the “need [was] alleviated by the patent.” *Id.* at 1332.

163. A lack of demand because of general satisfaction with the prior art is contrary to a finding of long-felt need. *Nat'l Steel Car, Ltd.*, 357 F.3d at 1340 (“[A] finding of no customer demand is flatly contradictory with [the district court's] conclusion that a long-felt need existed[.]”).

(6) Prior Art Teaches Away

164. “[A] showing that a prior art reference teaches away from a given combination is evidence that one of skill in the art would not have been motivated to make that combination to arrive at the claimed invention. But the absence of a formal teaching away in one reference does not automatically establish a motivation to combine it with another reference in the same field.” *Rembrandt Wireless Techs., LP v. Samsung Elecs. Co.*, 853 F.3d 1370, 1379–80 (Fed. Cir. 2017). “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *Millennium Pharms., Inc. v. Sandoz Inc.*, 862 F.3d 1356, 1366 (Fed. Cir. 2017) (quoting *In re Urbanski*, 809 F.3d 1237, 1244 (Fed. Cir. 2016)).

165. A reference does not teach away “if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *Polaris Indus.*, 882 F.3d at 1069 (quoting *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009)).

(7) Industry Praise

166. “Evidence that the industry praised a claimed invention or a product that embodies the patent claims weighs against an assertion that the same claimed invention would have been obvious.” *Alarm.com, Inc. v. SecureNet Techs., LLC*, No. 15-807-RGA, 2019 WL 133228, at *4 (D. Del. Jan. 8, 2019) (Andrews, J.) (citation omitted). “[A]n expert must establish a nexus between the industry praise and the patented *technology*.” *Cot’n Wash, Inc. v. Henkel Corp.*, 56 F. Supp. 3d 626, 650 (D. Del. 2014) (emphasis added); *see also Alarm.com*, 2019 WL 133228, at *5 (rejecting evidence of industry praise because the evidence did not relate to the patented technology). Industry praise is not probative of nonobviousness if the praise is “directed to . . . an element already known in the prior art.” *S. Ala. Med. Sci. Found. v. Gnosis S.P.A.*, 808 F.3d 823, 827 (Fed. Cir. 2015).

167. Identified evidence of praise must be objective, and not self-serving statements by the patentee or related entities. *See Geo. M. Martin Co.*, 618 F.3d at 1305 (rejecting evidence of industry praise when it was offered in the form of statements by the patentee’s own president and employee emails). A patentee’s pre-existing market share may reduce the impact of the purported industry praise. *Id.*

(8) Commercial Success

168. “Evidence of commercial success . . . is only significant if there is a nexus between the claimed invention and the commercial success.” *Ormco*, 463 F.3d at 1311-12. “When a

patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention.” *J.T. Eaton & Co. v. Atl. Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997); *see also Galderma*, 737 F.3d at 740; *In re Baxter Travenol Labs.*, 952 F.2d at 392 (“[I]nformation solely on numbers of units sold is insufficient to establish commercial success.”). Notably, a patentee can only rely on the “commercial success of a product embodying [the claimed] invention[.]” *Merck & Co.*, 395 F.3d at 1376. Thus, “if the commercial success is due to an unclaimed feature of the [product], the commercial success is irrelevant.” *Ormco*, 463 F.3d at 1312; *see also Ethicon Endo-Surgery, Inc. v. Covidien LP*, 812 F.3d 1023, 1034 (Fed. Cir. 2016) (affirming obviousness when the commercial success of the relevant product may have been due to unclaimed features rather than the claimed invention). “So too if the feature that creates the commercial success was known in the prior art, the success is not pertinent.” *Ormco*, 463 F.3d at 1312; *see also J.T. Eaton*, 106 F.3d at 1571 (“[T]he asserted commercial success of the product must be due to the merits of the claimed invention beyond what was readily available in the prior art.”).

169. “When others are legally barred from commercially testing the ideas of the claimed invention, the financial success is not significantly probative of that question.” *Hospira*, 285 F. Supp. 3d at 796-797 (citation omitted). Despite even strong evidence of commercial success, the existence of a “blocking patent may deter non-owners and non-licensees from investing the resources needed to make, develop, and market such a later, ‘blocked’ invention, because of the risk of infringement liability and associated monetary injunctive remedies.” *See Acorda Therapeutics*, 903 F.3d at 1337. A previously issued patent that precludes others from entering the market undermines evidence of commercial success, particularly in ANDA cases. *See Merck*

& Co., 395 F.3d at 1377 (holding that “[b]ecause market entry by others was precluded on [the bases of another patent and regulatory exclusivity], the inference of non-obviousness of weekly-dosing, from evidence of commercial success, is weak.”); *Sanofi-Aventis Deutschland GMBH v. Mylan Pharmas. Inc.*, 791 F. App’x 916, 928 (Fed. Cir. 2019) (holding that the previously issued compound patents listed in the FDA’s Orange Book would have deterred competitors from commercializing the claimed formulations).

170. To show a nexus between any evidence of commercial success and the claimed invention, “the proponent must offer proof that the sales were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter.” *In re DBC*, 545 F.3d 1373, 1384 (Fed. Cir. 2008) (citation and internal quotation marks omitted) (holding that evidence of mere sales, however substantial, “does not reveal in any way that the driving force behind those sales was the claimed combination”). For example, significant pre-existing market share can serve as the basis for rejecting evidence of commercial success. *See, e.g., Boston Sci. SciMed, Inc. v. Iancu*, 811 F. App’x 618, 628-29 (Fed. Cir. 2020) (holding that the patentees “commercial success was a result of . . . pre-existing, dominant market share” and provided only “minimal support” for non-obviousness); *Geo. M. Martin Co.*, 618 F.3d at 1304 (giving commercial success “little weight” where pre-existing market share drove commercial success and not the claimed invention).

(9) Copying

171. When a patentee relies on evidence of copying as evidence of non-obviousness, “[j]ust as with the commercial success analysis, a nexus between the copying and the novel aspects of the claimed invention must exist for evidence of copying to be given significant weight in an

obviousness analysis.” *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) (alteration in original; citation omitted).

172. “[E]vidence of copying [the reference listed drug preparations] in the ANDA context is not probative of nonobviousness because a showing of bioequivalence is required for FDA approval.” *Bayer Healthcare Pharms., Inc. v. Watson Pharms., Inc.*, 713 F.3d 1369, 1377 (Fed. Cir. 2013); *see also Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 923 F. Supp. 2d 602, 676 (D. Del. 2013) (“a showing of copying . . . is not compelling evidence [of nonobviousness]” (alteration in original, citation omitted)), *aff’d*, 752 F.3d 967 (Fed. Cir. 2014); (“[A] showing of copying is not compelling evidence of non-obviousness in Hatch-Waxman cases due to the nature of the ANDA process” (citations omitted)); *Allergan, Inc. v. Watson Lab’ys, Inc.-Fla.*, 869 F. Supp. 2d 456, 485 (D. Del. 2012) (“[A]s several courts have recognized, demonstration that a defendant has copied a patented invention is not compelling evidence of non-obviousness in the Hatch-Waxman context due to the unique nature of the ANDA process.”), *aff’d*, 470 F. App’x 903 (Fed. Cir. 2012).

7. Written Description

173. A patent claim is invalid if the patent does not contain an adequate written description of the claimed invention. Section 112 of the Patent Act provides that “[t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art . . . to make and use the same[.]” 35 U.S.C. § 112(a). The written description must “reasonably convey[] to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). Specifically, the written description must “clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.” *Id.* (quoting

Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563 (Fed. Cir. 1991)); *see also LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed. Cir. 2005) (“[The written description] must describe the invention sufficiently to convey to a person of skill in the art that the patentee had possession of the claimed invention at the time of the application, i.e., that the patentee invented what is claimed.”); *Carnegie Mellon Univ. v. Hoffmann-La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008) (the applicant must “convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,’ and demonstrate that by disclosure in the specification of the patent.” (quoting *Vas-Cath*, 935 F.2d at 1563-64)); *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 926 (Fed. Cir. 2004) (an adequate written description must “describe the claimed subject matter in terms that establish that [the applicant] was in possession of the . . . claimed invention, including all of the elements and limitations” (alterations in original) (quoting *Hyatt v. Boone*, 146 F.3d 1348, 1353 (Fed. Cir. 1998))). Whether a patent claim satisfies the written description requirement is a question of fact. *Ariad*, 598 F.3d at 1351.

174. To adequately describe their invention, inventors must convey that they “possessed the full scope of the claimed invention.” *Juno Therapeutics, Inc. v. Kite Pharma, Inc.*, 10 F.4th 1330, 1336 (Fed. Cir. 2021); *Amgen Inc. v. Sanofi*, 872 F.3d 1367, 1373-74 (Fed. Cir. 2017) (a patentee must convey in its disclosure that it “had possession of the claimed subject matter as of the filing date.”) (quotation omitted); *Lipocine Inc. v. Clarus Therapeutics, Inc.*, 541 F. Supp. 3d 435, 448 (D. Del. 2021) (claims lacked written description support where specification did “not contain a written description sufficient to demonstrate that the inventors possessed the full scope of the claimed inventions.”).

175. In determining whether a specification contains an adequate written description, “one must make an ‘objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.’” *Bos. Sci. Corp. v. Johnson & Johnson*, 647 F.3d 1353, 1366 (Fed. Cir. 2011) (quoting *Ariad*, 598 F.3d at 1351). “[A] broad claim is invalid [for lack of adequate written description] when the entirety of the specification clearly indicates that the invention is of a much narrower scope.” *Carnegie Mellon*, 541 F.3d at 1127 (quoting *Cooper Cameron Corp. v. Kvaerner Oilfield Prods., Inc.*, 291 F.3d 1317, 1323 (Fed. Cir. 2002)); *see also ICU Med., Inc. v. Alaris Med. Sys., Inc.*, 558 F.3d 1368, 1378 (Fed. Cir. 2009) (“[A] person of skill in the art would not understand the inventor . . . to have invented a spikeless medical valve.”); *LizardTech*, 424 F.3d at 1345 (invalidating a claim that was “directed to creating a seamless array of DWT coefficients generically” because the specification taught only “a particular method” of creating such a seamless array). “[O]ne cannot disclose a forest in the original application, and then later pick a tree out of the forest and say here is my invention.” *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1326-27 (Fed. Cir. 2000) (finding “nothing in the written description of Examples 1 and 3 that would suggest to one skilled in the art that the [claimed invention] is an important defining quality of the formulation, nor does the disclosure even motivate one to [reach the claimed invention]”).

176. Patents may need to disclose experimental data to provide an adequate written description if the inventor expressly claims that the invention achieves a certain result or has an efficacy limitation. *Nuvo Pharms. (Ireland) Designated Activity Co. v. Dr. Reddy’s Lab’ys Inc.*, 923 F.3d 1368, 1384 (Fed. Cir. 2019) (“[W]hen the inventor expressly claims that result, our case law provides that that result must be supported by adequate disclosure in the specification.”); *see also Biogen Int’l GmbH v. Mylan Pharms. Inc.*, 18 F.4th 1333, 1337, 1343-46 (Fed. Cir. 2021)

(affirming invalidation of patent lacking clinical data for inadequately describing “therapeutically effective amount”).

177. “A ‘mere wish or plan’ for obtaining the claimed invention is not adequate written description.” *Centocor Ortho Biotech, Inc. v. Abbott Lab’ys*, 636 F.3d 1341, 1348 (Fed. Cir. 2011) (citation omitted); *see also Regents of the Univ. of Cal. v. Eli Lilly & Co.*, 119 F.3d 1559, 1568 (Fed. Cir. 1997) (“The description requirement of the patent statute requires a description of an invention, not an indication of a result that one might achieve if one made that invention.”).

178. Written description is not a question of whether a skilled person might be able to construct the patentee’s invention from the teachings of the disclosure; rather, it is a question of whether the application “necessarily discloses” the particular invention. *See Purdue Pharma*, 230 F.3d at 1327 (citation omitted). “[A] description that merely renders the invention obvious does not satisfy the requirement.” *Ariad*, 598 F.3d at 1352.

179. Where a patentee seeks to satisfy the written description requirement by an inherent disclosure, the missing descriptive matter must necessarily be present in the patent’s specification such that a person of skill in the art would recognize it. *See, e.g., Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1159-60 (Fed. Cir. 1998); *see also Therasense*, 593 F.3d at 1332 (“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.” (citations omitted) (emphasis in original)).

8. Inventorship

180. Improper inventorship is a question of law which may be predicated on underlying factual findings. *See Plastipak Packaging, Inc. v. Premium Waters, Inc.*, 55 F.4th 1332, 1340 (Fed. Cir. 2022). A patent is invalid for improper inventorship when it does not name the correct inventors. *See Trovan, Ltd. v. Sokymat SA*, 299 F.3d 1292, 1301 (Fed. Cir. 2002) (“A patent is invalid if more or less than the true inventors are named.”)

181. “All inventors, even those who contribute to only one claim or one aspect of one claim of a patent, must be listed on that patent.” *See Vapor Point LLC v. Moorhead*, 832 F.3d 1343, 1348-49 (Fed. Cir. 2016). “While inventorship is evaluated on a claim-by-claim basis, the failure to join an inventor of any claim invalidates the entire patent.” *Plastipak Packaging, Inc. v. Premium Waters, Inc.*, 55 F.4th 1332, 1340-41 (Fed. Cir. 2022) (overturning on other grounds a district court’s grant of summary judgment of invalidity for improper inventorship for failing to name a joint inventor even though only certain claims of each patent were asserted).

182. “Conception is the touchstone of inventorship[.]” *Trovan*, 299 F.3d at 1301 (citation omitted). A party may demonstrate conception “only when the idea is so clearly defined in the inventor’s mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.” *Burroughs Wellcome Co. v. Barr Lab’ys, Inc.*, 40 F.3d 1223, 1227-28 (Fed. Cir. 1994). “[A]n inventor need not know that his invention will work for conception to be complete[,]” but rather “need only show that he had the idea; the discovery that an invention works is part of its reduction to practice.” *Id.* at 1228. When there is evidence that the true inventor had formed a definite and permanent idea of the method of treatment’s inventive qualities, and had in fact observed them, it is immaterial that the inventor’s knowledge was not scientifically certain and that other researchers helped them gain such scientific certainty. *See Univ. of Pittsburgh of Commonwealth Sys. of Higher Educ. v. Hedrick*, 573 F.3d 1290, 1299 (Fed. Cir. 2009) (“Katz’s laboratory notebooks sufficiently described to those skilled in the art how to isolate the cells from adipose-tissue, at which point they would be in possession of the invention. Thus, they had disclosed a completed thought expressed in such clear terms as to enable those skilled in the art to make the invention.” (citation and internal quotation marks omitted)).

183. Improper inventorship may be a result of either misjoinder (i.e., naming an inventor who is not a true inventor); or nonjoinder (i.e., omitting a true inventor who was not named in the patent). *CODA Dev. S.R.O. v. Goodyear Tire & Rubber Co.*, 916 F.3d 1350, 1358 (Fed. Cir. 2019). Through claims of misjoinder and nonjoinder together, § 256 also “allows complete substitution of inventors.” *Id.* (citation omitted).

184. To be a joint inventor, one must: “(1) contribute in some significant manner to the conception or reduction to practice of the invention, (2) make a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention, and (3) do more than merely explain to the real inventors well-known concepts and/or the current state of the art.” *In re VerHoef*, 888 F.3d 1362, 1366 (Fed. Cir. 2018) (quoting *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1351 (Fed. Cir. 1998)).

IV. UNENFORCEABILITY DUE TO INEQUITABLE CONDUCT

A. Issues

185. Whether Liquidia has proven, by clear and convincing evidence, that the ‘327 patent is unenforceable due to inequitable conduct before the U.S. Patent and Trademark Office (“PTO”) during prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF)*, § XII.

186. Whether Stephen Maebius and/or Shaun Snader (a) made an affirmative misrepresentation of material facts; (b) failed to disclose material information; or (c) submitted false material information to the PTO. *See Ex. 3 (Liquidia SOF)*, § XII.

187. Whether the Patent Owner Response submitted by UTC during the *inter partes review* (“IPR”) of the ‘793 patent (“‘793 IPR”) (DTX0007), which Messrs. Maebius and Snader failed to disclose to the PTO, was but-for material to the prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF)*, § XII.

188. Whether the declaration of Dr. Aaron Waxman in support of its Patent Owner Response submitted by UTC during the ‘793 IPR (DTX0101), which Messrs. Maebius and Snader failed to disclose to the PTO, was but-for material to the prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF), § XII.*

189. Whether the Final Written Decision (“FWD”) issued by the Patent Trial and Appeals Board (“PTAB”) during the ‘793 IPR (DTX0085), which Messrs. Maebius and Snader failed to disclose to the PTO, was but-for material to the prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF), § XII.*

190. Whether the Court of Appeals for the Federal Circuit’s decision affirming the PTAB’s FWD (DTX0075), which Messrs. Maebius and Snader failed to disclose to the PTO, was but-for material to the prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF), § XII.*

191. Whether the District Court’s trial opinion regarding the claim construction of the ‘793 patent (DTX0083), which Messrs. Maebius and Snader failed to disclose to the PTO, was but-for material to the prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF), § XII.*

192. Whether the trial testimony of Liquidia’s expert, Dr. Hill (DTX0076), which Messrs. Maebius and Snader failed to disclose to the PTO, was but-for material to the prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF), § XII.*

193. Whether the Court of Appeals for the Federal Circuit’s decision affirming the District Court’s trial opinion regarding the claim construction of the ‘793 patent (DTX0084), which Messrs. Maebius and Snader failed to disclose to the PTO, was but-for material to the prosecution of the ‘327 patent. *See Ex. 3 (Liquidia SOF), § XII.*

194. Whether Messrs. Maebius and Snader had a specific intent to deceive the PTO. *See Ex. 3 (Liquidia SOF), § XII.C.*

195. Whether Messrs. Maebius and Snader complied with their duty to disclose to the PTO all information known to them to be material to patentability as required by 37 C.F.R. § 1.56. *See Ex. 3 (Liquidia SOF), § XII.*

B. Legal Authority

1. Inequitable Conduct

196. “Inequitable conduct is an equitable defense to patent infringement that, if proved, bars enforcement of a patent.” *Regeneron Pharm., Inc. v. Merus N.V.*, 864 F.3d 1343, 1350 (Fed. Cir. 2017) (quoting *Therasense*, 649 F.3d at 1285); *see also GS Cleantech Corp. v Adkins Energy LLC*, 951 F.3d 1310, 1330-31 (Fed. Cir. 2020) (affirming district court’s holding that patents were unenforceable due to inequitable conduct); *Energy Heating, LLC v. Heat On-The-Fly, LLC*, 889 F.3d 1291, 1303 (Fed Cir 2018). “Unlike validity defenses, which are claim specific, *see* 35 U.S.C. § 288, inequitable conduct regarding any single claim renders the entire patent unenforceable.” *Therasense*, 649 F.3d at 1288.

197. Each inventor named in a patent application, each attorney who prepares or prosecutes the application, and anyone else substantively involved in the preparation or prosecution of an application who is associated with the applicant, has a duty of candor and good faith in dealing with the U.S. Patent and Trademark Office (“PTO”) which includes a duty to disclose to the PTO all information known to the individual to be material to patentability. *See Avid Identification Sys., Inc. v. Crystal Imp. Corp.*, 603 F.3d 967, 973 (Fed. Cir. 2010) (citing 37 C.F.R. § 1.56(c)(3)).

198. Inequitable conduct occurs when a patent applicant breaches their “duty of candor and good faith” to the PTO. 37 C.F.R. § 1.56(a). Intentionally failing to disclose prior art material to the PTO’s determination of patentability constitutes inequitable conduct. *See Therasense*, 649 F.3d at 1290–91. An individual’s duty to disclose exists throughout the entire course of the

application process, up through the date of issuance or abandonment. *See Sprint Commc's Co. LP v. Charter Commc's ns, Inc.*, C.A. No. 17-1734-RGA, 2021 WL 982728, at *2 (D. Del. Mar 16, 2021).

199. Rule 56 (“Duty to disclose information material to patentability”) states:

Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a *prima facie* case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

37 C.F.R. § 1.56(b).

200. To prove inequitable conduct, the challenger must show by clear and convincing evidence that the patent applicant (1) misrepresented or omitted information material to patentability, and (2) did so with specific intent to mislead or deceive the PTO. *See Therasense*, 649 F.3d at 1287; *In re Rembrandt Techs. LP Pat. Litig.*, 899 F.3d 1254, 1272 (Fed. Cir. 2018).

201. “[A]s a general matter, the materiality required to establish inequitable conduct is but-for materiality.” *Therasense*, 649 F.3d at 1291; *In re Rembrandt Techs. LP Pat. Litig.*, 899 F.3d at 1273 (the but-for materiality analysis assesses whether the information withheld or misrepresented is “material to patentability—or at least continued enforceability.”). “When an applicant fails to disclose prior art to the PTO, that prior art is but-for material if the PTO would not have allowed a claim had it been aware of the undisclosed prior art.” *Therasense*, 649 F.3d at 1291. “Hence, in assessing the materiality of a withheld reference, the court must determine whether the PTO would have allowed the claim if it had been aware of the undisclosed reference.”

Id. “In determining the materiality of a reference, the court applies the preponderance of the evidence standard and gives claims their broadest reasonable construction.” *See Regeneron Pharm.,* 864 F.3d at 1350.

202. “A prior art reference that is otherwise material is not but-for material if it is merely cumulative.” *Luv N’ Care, Ltd. v. Laurain*, 98 F.4th 1081, 1098 (Fed. Cir. 2024) (citation and internal quotation marks omitted). A reference is cumulative if it teaches no more than what an examiner would consider to be taught by the prior art already before the examiner. *See id.* During prosecution, a patent examiner assesses the application and prior art from the perspective of a POSA. *See In re Nouvel*, 493 F. App’x 85, 92 (Fed. Cir. 2012) (finding that “an examiner’s reasoning ‘may include recourse to logic, judgment, and common sense available to *a person of ordinary skill* that do not necessarily require explication in any reference or expert opinion.’” (emphasis added) (citing *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328-29 (Fed. Cir. 2009); *In re Bozek*, 416 F.2d 1385, 1390 (C.C.P.A. 1969)).

203. The Federal Circuit has also held that information from prior patent litigation proceedings is material. *See Leviton Mfg. Co. v. Universal Sec. Instruments, Inc.*, 606 F.3d 1353, 1362 (Fed. Cir. 2010) (finding patentee’s failure to disclose existence of earlier related litigation was “material” to its application for patent despite patentee’s claim that it was not material due to its success on the validity of the patents in earlier litigation); *Nilssen v. Osram Sylvania, Inc.*, 504 F.3d 1223, 1233-34 (Fed. Cir. 2007) (holding that the existence of earlier related litigation itself was material information).

204. With regard to the intent element, “the accused infringer must prove that the patentee acted with the specific intent to deceive the PTO.” *Therasense*, 649 F.3d at 1290. “In a case involving nondisclosure of information . . . the accused infringer must prove by clear and

convincing evidence that the applicant knew of the reference, knew that it was material, and made a deliberate decision to withhold it.” *Id.*

205. Courts “may infer intent from indirect and circumstantial evidence.” *Id.*; *see also Sprint Commc’ns*, 2021 WL 982728, at *4 (because “[d]irect evidence of intent is rare . . . a court must often infer intent from surrounding circumstances.” (alteration in original; citation omitted)). When specific intent is inferred, deceptive intent “must be the single most reasonable inference able to be drawn from the evidence.” *GS Cleantech*, 951 F.3d at 1329 (citing *Therasense*, 649 F.3d at 1290).

206. Misrepresentations or omissions about what the prior art discloses, such as the scope of teachings of the prior art, could demonstrate an intent to deceive. *See Luv N’ Care*, 98 F.4th at 1098.

207. The Federal Circuit “has held that a trial court may infer deceptive intent based on a showing that a patentee withheld references with which it was intimately familiar and which were inconsistent with its own patentability arguments to the PTO.” *Agfa Corp. v. Creo Prods. Inc.*, 451 F.3d 1366, 1378 (Fed. Cir. 2006).

208. “A mere denial of intent to mislead (which would defeat every effort to establish inequitable conduct) will not suffice[.]” *Critikon, Inc. v. Becton Dickinson Vascular Access, Inc.*, 120 F.3d 1253, 1257 (Fed. Cir. 1997) (“[A] patentee facing a high level of materiality and clear proof that it knew or should have known of that materiality, can expect to find it difficult to establish ‘subjective good faith’ sufficient to prevent the drawing of an inference of intent to mislead.”). Similarly, assertions of memory lapse, ignorance, and attorney-client privilege are also insufficient to overcome the inference of intent. *See, e.g., Brasseler, U.S.A. I, L.P. v. Stryker Sales*

Corp., 267 F.3d 1370, 1383-85 (Fed. Cir. 2001); *McKesson Info. Sols., Inc. v. Bridge Med., Inc.*, 487 F.3d 897, 910, 926-27 (Fed. Cir. 2007).

V. EXCEPTIONAL CASE

A. Issues

209. If UTC proves infringement of any valid asserted claim of the ‘327 patent, whether UTC has met its burden of proof to secure reasonable attorneys’ fees and costs under 35 U.S.C. § 285.

210. Whether Liquidia is entitled to a judgment declaring this case exceptional and awarding Liquidia its reasonable attorneys’ fees and costs under 35 U.S.C. § 285.

B. Legal Authority

211. In exceptional cases, a court may award reasonable attorneys’ fees to the prevailing party. *See* 35 U.S.C. § 285.

212. In deciding whether to award attorney fees under Section 285, the court must undertake a two-step inquiry. *Wedgetail, Ltd. v. Huddleston Deluxe, Inc.*, 576 F.3d 1302, 1304 (Fed. Cir. 2009).

213. First, the court must determine whether there is clear and convincing evidence that the case is exceptional. *Wedgetail*, 576 F.3d at 1304. In deciding whether a case is exceptional, the court must evaluate whether it “stands out from others with respect to the substantive strength of a party’s litigating position (considering both the governing law and the facts of the case) or the unreasonable manner in which the case was litigated.” *Octane Fitness, LLC v. ICON Health & Fitness, Inc.*, 572 U.S. 545, 554 (2014). This determination is a “case-by-case exercise” to be made “considering the totality of the circumstances.” *Id.* The burden of proof rests with the prevailing party. *See Otsuka Pharm. Co. v. Sandoz, Inc.*, No. 07-1000 (MLC), 2015 WL 5921035, at *8 (D.N.J. Oct. 9, 2015).

214. Second, the court must determine whether an award of attorneys' fees to the prevailing party is warranted. *Wedgetail*, 576 F.3d at 1304. Absent serious misconduct, courts have been reluctant to award fees to a prevailing party. *See Otsuka Pharm.*, 2015 WL 5921035, at *6-7. Examples of such serious misconduct include misleading statements "coupled with affirmative, false declarations submitted to the PTO in order to procure patents," filing of frivolous lawsuits, and re-litigation of issues already decided by the court. *Intellect Wireless, Inc. v. Sharp Corp.*, 45 F. Supp. 3d 839, 853 (N.D. Ill. 2014) (granting competitors' request for attorneys' fees); *see also Chalumeau Power Sys. LLC v. Alcatel-Lucent*, Civ. A. No. 11-1175-RGA, 2014 WL 4675002, at *3 (D. Del. Sept. 12, 2014) (granting defendants' motion for attorneys' fees and costs), *aff'd, Chalumeau Power Sys. LLC v. Alcatel-Lucent Enter. USA, Inc.*, 611 F. App'x 1008 (Fed. Cir. 2015). Such conduct is akin to the "'pattern of deceit' recognized by the Federal Circuit" in determining whether a case is exceptional under Section 285. *Intellect Wireless*, 45 F. Supp. 3d at 853; *see also Wedgetail*, 576 F.3d at 1304.

215. According to 35 U.S.C. § 285: "The court in exceptional cases may award reasonable attorney fees to the prevailing party." According to the Supreme Court, "an 'exceptional' case is one that stands out from others with respect to the substantive strength of a party's litigating position (considering both the governing law and the facts of the case) or the unreasonable manner in which the case was litigated." *Octane Fitness, LLC v. ICON Health & Fitness, Inc.*, 572 U.S. 545, 554 (2014). "District courts may determine whether a case is 'exceptional' in the case-by-case exercise of their discretion, considering the totality of the circumstances." *Id.* The Court further stated: "As in the comparable context of the Copyright Act, '[t]here is no precise rule or formula for making these determinations, but instead equitable discretion should be exercised 'in light of the considerations we have identified.'" *Id.* (citation

omitted) (quoting *Fogerty v. Fantasy, Inc.*, 510 U.S. 517, 534 (1994)). The Court added that section 285 “demands a simple discretionary inquiry; it imposes no specific evidentiary burden, much less . . . a high one. Indeed, patent-infringement litigation has always been governed by a preponderance of the evidence standard....” *Id.* at 1758.

EXHIBIT 6

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS)
CORPORATION,)
Plaintiff,) C.A. No. 23-00975-RGA-SRF
v.)
LIQUIDIA TECHNOLOGIES, INC.,)
Defendant.)

EXHIBIT 6: PLAINTIFF'S WITNESS LIST

I. FACT WITNESSES

Plaintiff United Therapeutics Corporation (“UTC”) identifies the following fact witnesses it may call live or by deposition at trial. UTC reserves the right to modify this list in accordance with Federal Rule of Civil Procedure 26(a)(3), District of Delaware Local Rule 16.3, or in view of other events or changed circumstances that may occur before or during trial. UTC expressly reserves the right to call live or by deposition any witness on its witness list or any witness on the witness list of Defendant. This list is not a commitment that UTC will call any particular witness at trial, or a representation that any witness listed is available or will appear for trial. If any UTC, Defendant, or third-party witness is unavailable or refuses to testify live, UTC reserves the right to use his or her deposition testimony. With respect to Defendant’s witnesses, UTC reserves the right to introduce testimony through deposition or live examination, as appropriate. In addition, UTC reserves the right to call any witness, whether listed below or not, to establish authenticity and/or admissibility of any trial exhibit whose authenticity or admissibility is challenged by Defendant. Notwithstanding the provision of this list, UTC makes no representation regarding its ability to force any witness to appear at trial unwillingly.

UTC also reserves the right to call in its case in chief any witness identified by Defendant and to call by deposition any witness identified by Defendant who does not testify at trial or who is unavailable. UTC also reserves the right to call any witness in its list either in its case in chief, or as a rebuttal witness, or both. UTC reserves the right to call any witness for impeachment purposes.

UTC may call live or by designation:

1. Dr. Mariana Faria-Urbina
2. Mr. Noah Byrd

3. Mr. Dean Bunce
4. Dr. Victor Tapson
5. Dr. Leigh Peterson
6. Mr. Kevin Laliberte
7. Mr. Stephen Maebius
8. Mr. Shaun Snader
9. Mr. Brian Patterson
10. Dr. Michael Wade
11. Mr. Gregory Bottorff
12. Dr. Chunqin Deng
13. Dr. Peter Smith
14. Mr. David Barton
15. Dr. Kiernan DeAngelis
16. Mr. Vijay Nainani
17. Dr. Aaron Waxman
18. Dr. Kishan Parikh
19. Dr. Rajan Saggar
20. Dr. Rajeev Saggar
21. Ms. Janet Tully
22. Mr. Jason Adair

II. EXPERT WITNESSES

UTC lists below the names of the experts it may call at trial. The listed experts' scientific specialties and qualifications are set forth in detail in Exhibit 15 (UTC's Experts' CVs) and Exhibit

16 (Defendant's Experts' CVs). Plaintiff intends to call its experts at trial and does not currently intend to seek to introduce their testimony by deposition designation unless one or more of its experts becomes unavailable and/or is unable or unwilling to travel or testify live at trial.

1. Dr. Steven Nathan
2. Dr. Ronald Thisted
3. Dr. Bradley Wertheim
4. Dr. Frederic Selck
5. Dr. Nicholas Hill
6. Dr. Stephen Ogenstad
7. Dr. Richard Channick
8. Mr. Douglas Kidder

III. LIQUIDIA'S OBJECTIONS TO UTC'S WITNESS LIST

Defendant Liquidia Technologies, Inc. ("Liquidia") objects to UTC's list of fact witnesses as cumulative. Liquidia also objects to UTC affirmatively using deposition designations for UTC's own officers and employees unless a Fed. R. Evid. 804 hearsay exception is first satisfied. Liquidia also objects to UTC calling at trial any fact witnesses not identified on UTC's Fed. R. Civ. P. 26(a)(1) disclosures, not identified as a document custodian, and/or not deposed in his or her personal capacity or not designated on specific Fed. R. Civ. P. 30(b)(6) deposition topics.

Liquidia objects to UTC's list of expert witnesses as cumulative and unduly burdensome as UTC has identified eight (8) experts for a three-day bench trial. As noted below, UTC's experts provide duplicative and cumulative testimony as to the infringement and validity of U.S. Patent No. 11,826,327 ("the '327 patent") and offer opinions that are not relevant to any claims or defenses of either party.

Liquidia objects to any testimony by any of UTC's expert witnesses to the extent their

testimony is outside the scope of their expert reports, their expertise, or their opinions offered in this case. Liquidia also objects to any testimony of any of UTC's expert witnesses to the extent their testimony pertains to any opinions that have either been stricken or precluded by the Court. Liquidia objects to any testimony of any of UTC's expert witnesses to the extent they raise new issues of claim construction that were not presented to the Court during the claim construction phase of the case. Liquidia further objects to any testimony by any of UTC's expert witnesses to the extent their testimony pertains to any issue that has been decided by the Court.

Liquidia objects to UTC calling at trial any witness listed on its witness list by deposition testimony to the extent that the witness testifies live at trial.

In addition, Liquidia makes the following specific objections:

1. **Dr. Steven Nathan and Dr. Ronald Thisted:** First, Liquidia objects to UTC calling Dr. Nathan and Dr. Thisted to testify as needlessly cumulative and duplicative because both testify as to the alleged validity and infringement of the '327 patent. *See Fed. R. Evid. 403.* Second, Liquidia objects to UTC calling Dr. Nathan and Dr. Thisted to testify as confusing, unduly prejudicial, and likely to cause delay and waste time because they offer inconsistent testimony regarding the type of patient deemed to have "pulmonary hypertension associated with interstitial lung disease" ("PH-ILD") as recited in claim 1 of the '327 patent. *See Fed. R. Evid. 403; see also* Liquidia's Motion *in Limine* regarding "Pulmonary Hypertension Associated with Interstitial Lung Disease" Recited in Claim 1 of the '327 Patent." Third, Liquidia objects to UTC calling Dr. Nathan and Dr. Thisted as unreliable and/or irrelevant because they rely on inconsistent claim constructions for infringement and validity, and because they opine on the validity of claims that are entitled to no patentable weight. *See Fed. R. Evid. 702; Fed. R. Evid. 402; Fed. R. Evid. 403;* *see also* D.I. 283, 311.

2. **Dr. Steven Nathan and Dr. Bradley Wertheim:** Liquidia objects to UTC calling Dr. Nathan and Dr. Wertheim to testify as confusing, unduly prejudicial, and likely to cause delay and waste time because they offer inconsistent testimony regarding the scope of the term “force vital capacity” (“FVC”) in claims 9-10 of the ’327 patent. *See* Fed. R. Evid. 403; *see also* Liquidia’s Motion *in Limine* regarding Improvements in “Forced Vital Capacity” Recited in Claims 9 and 10 of the ’327 Patent.

3. **Dr. Ronald Thisted:** Liquidia objects to UTC calling Dr. Thisted to testify regarding validity and infringement as unreliable, confusing, and unduly prejudicial because he does not qualify as a person of ordinary skill in the art for purposes of this case. *See* Fed. R. Evid. 702; Fed. R. Evid. 402; Fed. R. Evid. 403; *see also* D.I. 279, 310.

4. **Dr. Bradley Wertheim:** Liquidia objects to UTC calling Dr. Wertheim to testify as unreliable, confusing, and unduly prejudicial because his priority date opinions are based on an unscientific and unsupported understanding of “correlation,” and his written description opinions ignore claim 10’s dependence on claim 9. *See* Fed. R. Evid. 702; Fed. R. Evid. 402; Fed. R. Evid. 403; *see also* D.I. 281, 312.

EXHIBIT 7

EXHIBIT 7

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS CORPORATION,)
Plaintiff,) C.A. No. 23-975-RGA-SRF
v.)
LIQUIDIA TECHNOLOGIES, INC.,)
Defendant.)

Liquidia's List of Witnesses to be Called Live or by Deposition

1. Pursuant to Local Rule 16.3(c)(7), Defendant Liquidia Technologies, Inc. (“Liquidia”) hereby submits the following lists of witnesses whom it may call live or by deposition at trial.
2. Liquidia reserves the right to call substitute witnesses to the extent that a witness’s circumstances change, or a witness otherwise becomes unavailable for trial. Liquidia further reserves the right to call any witness for impeachment purposes.
3. Liquidia reserves the right to call any witness, whether listed below or not, to establish authenticity and/or admissibility of any trial exhibit whose authenticity or admissibility is challenged by Plaintiff United Therapeutics Corporation (“UTC”).
4. Liquidia expressly reserves the right to call, either live or by deposition, any witness on UTC’s witness list, either in Liquidia’s case-in-chief, or as a rebuttal witness, or both.
5. Liquidia intends to call some or all of the witnesses identified below either live or by deposition (transcript or video). This list is not a commitment that Liquidia will call any

particular witness at trial, or a representation that any witness listed is available or will appear for trial. If any witness is unavailable or refuses to testify live, Liquidia reserves the right to introduce testimony through deposition.

6. Liquidia also reserves the right to object to the deposition or trial testimony of any individual identified in its disclosures.

7. Liquidia may present testimony at trial from the following fact witnesses, either live or by deposition:

- a. Jason Adair (Live or by Deposition)
- b. David Barton (By Deposition)
- c. Greg Bottorff (By Deposition)
- d. Dean Bunce (By Deposition)
- e. Noah Byrd (By Deposition)
- f. Kiernan Deangelis (By Deposition)
- g. Chunqin (“C.Q.”) Deng (By Deposition)
- h. Marina Faria-Urbina (By Deposition)
- i. Kevin Laliberte (By Deposition)
- j. Steven Maebius (By Deposition)
- k. Vijay Nainani (By Deposition)
- l. Kishan Parikh (By Deposition)
- m. Brian Patterson (By Deposition)
- n. Cynthia Leigh Peterson (By Deposition)
- o. Rajan Saggar (By Deposition)
- p. Rajeev Saggar (Live or by Deposition)

- q. Peter Smith (By Deposition)
- r. Shaun Snader (By Deposition)
- s. Victor Tapson (By Deposition)
- t. Janet Tully (Live or by Deposition)
- u. Michael Wade (By Deposition)
- v. Aaron Waxman (By Deposition)

8. Liquidia may present testimony live at trial from the following expert witnesses:

- a. Richard Channick, M.D.
- b. Nicholas Hill, M.D.
- c. Douglas Kidder
- d. Stephan Ogenstad, Ph.D.

PLAINTIFF'S OBJECTIONS TO DEFENDANT'S WITNESS LIST

Plaintiff United Therapeutics Corp. ("Plaintiff" or "UTC") provides its preliminary objections to Defendant Liquidia Technologies, Inc.'s ("Defendant" or "Liquidia") Witness List.

1. Plaintiff objects to the presentation of deposition testimony of any witness that is available pursuant to Federal Rule of Civil Procedure 32 or appears at trial for any purpose, including, for example, Jason Adair, Rajeev Saggar, and Janet Tully, which Defendant identified could appear "[l]ive or by [d]eposition." Plaintiff reserves the right to provide objections and counter-designations should Defendant be permitted to introduce testimony for such witnesses.

2. Plaintiff objects to the inclusion of objections or colloquy made by counsel in any designated deposition testimony.

3. Plaintiff objects to any witness designated by Defendant that is the subject of, or that may offer testimony that is the subject of, any motion *in limine* or *Daubert* motion filed by Plaintiff.

4. Plaintiff reserves the right to seek to introduce any testimony and/or call any witness listed in Defendant's Witness List, if otherwise admissible.

5. Plaintiff reserves the right to utilize deposition designations made by Defendant, as well as undesignated portions of deposition testimony for demonstratives, impeachment purposes, or rebuttal.

6. Plaintiff objects to Defendant calling any live witnesses by videoconference absent prior agreement or order of the Court.

7. Plaintiff reserves the right to object to any specific questions or testimony at the time proffered to the Court.

8. For any exhibits appearing within Defendant's designated testimony, Plaintiff's objections to use of such exhibits may appear in Defendant's Exhibit List (Exhibit 11).

9. For any exhibits appearing within Defendant's designated testimony, Plaintiff objects to Defendant's reliance on any exhibits that appear in Defendant's designations but that are not included in Defendant's Exhibit List (Exhibit 11).

10. Plaintiff reserves the right to object to Defendant calling witnesses identified on Plaintiff's Witness List but not on Defendant's Witness List should Defendant attempt to call any such witnesses live or by deposition.

I. General Objections

A. General Objections to Expert Witnesses

11. Plaintiff objects to the testimony of Defendant's experts to the extent that their testimony is related to any evidentiary issues raised by Plaintiff in the parties' proposed Pretrial Order.

12. Plaintiff objects to Defendant calling any of its expert witnesses by deposition.

13. Plaintiff objects to Defendants' experts and their testimony to the extent that Defendant's experts attempt to opine on matters outside the scope of their Federal Rule of Civil Procedure 26(a)(2)(B) expert reports, deposition testimony, or their respective experience or purported areas of expertise.

14. Plaintiff objects to Defendant's experts and their testimony to the extent that they or the testimony are objectionable under one or more of Federal Rules of Evidence 105, 702, 703, 611, 401, 402, and/or 403.

15. Plaintiff objects to Defendant's experts and their testimony to the extent that they or the testimony are duplicative of the testimony of other witnesses, including to the extent duplicative/cumulative over the testimony of Defendant's other experts.

16. Plaintiff objects to Defendant's experts and their testimony to the extent that they or their testimony have not been properly, timely, and sufficiently disclosed during fact or expert discovery pursuant to Federal Rules of Civil Procedure 26 and 37.

17. Plaintiff objects to Defendant's experts and their testimony to the extent that they or their testimony attempt to offer any rebuttal opinions not sufficiently described in their expert reports.

B. General Objections to Fact Witnesses

18. Plaintiff incorporates by reference any objection to proposed deposition testimony of any witness as set forth in Plaintiff's objections to Defendant's deposition designations.

19. Plaintiff objects to the testimony of any witness for which that witness lacks personal knowledge, testimony outside the scope of the Federal Rule of Civil Procedure 30(b)(6) testimony for which a witness was designated, testimony beyond the description for such witness as set forth in Defendant's Federal Rule of Civil Procedure 26(a) initial disclosures, testimony beyond the scope of Defendant's interrogatory responses, and/or testimony not otherwise properly disclosed under the Federal Rules of Civil Procedure.

20. Plaintiff objects to the testimony of any witness to the extent that it is impermissible under Federal Rules of Evidence 105, 701, 702, 703, 611, 401, 402, and/or 403.

21. Plaintiff reserves the right to provide objections and counter-designations to the designations of the transcripts of any witnesses' deposition by Defendant.

22. Plaintiff objects to Liquidia calling its own witnesses by designation absent an adequate showing under Federal Rule of Civil Procedure 32.

II. Specific Objections

A. Specific Objections to Expert Witnesses

23. **Richard Channick.** Plaintiff objects to Defendant calling Dr. Channick to the extent that his testimony will be duplicative of the testimony of other witnesses, including to the extent that his testimony is duplicative/cumulative over that of other experts. Plaintiff objects to Defendant calling Dr. Channick to the extent that his testimony is inadmissible under Federal Rules of Evidence 702 and 703. Plaintiff objects to Defendant calling Dr. Channick to the extent that his testimony is outside the scope of his expert report.

24. **Nicholas Hill.** Plaintiff objects to Defendant calling Dr. Hill to the extent that his testimony will be duplicative of the testimony of other witnesses, including to the extent that his testimony is duplicative/cumulative over that of other experts. Plaintiff objects to Defendant calling Dr. Hill to the extent that his testimony is inadmissible under Federal Rules of Evidence 702 and 703. *See generally* D.I. 285, D.I. 313. Plaintiff objects to Defendant calling Dr. Hill to the extent that his testimony is outside the scope of his expert report.

25. **Douglas Kidder.** Plaintiff objects to Defendant calling Mr. Kidder to the extent that his testimony will be duplicative of the testimony of other witnesses, including to the extent that his testimony is duplicative/cumulative over that of other experts. Plaintiff objects to Defendant calling Mr. Kidder to the extent that his testimony is inadmissible under Federal Rules of Evidence 702 and 703. Plaintiff objects to Defendant calling Mr. Kidder to the extent that his testimony is outside the scope of his expert report.

26. **Stephan Ogenstad.** Plaintiff objects to Defendant calling Dr. Ogenstad to the extent that his testimony will be duplicative of the testimony of other witnesses, including to the extent that his testimony is duplicative/cumulative over that of other experts. Plaintiff objects to Defendant calling Dr. Ogenstad to the extent that his testimony is inadmissible under Federal Rules of Evidence 702 and 703. *See generally* D.I. 287, D.I. 314. Plaintiff objects to Defendant calling Dr. Ogenstad to the extent that his testimony is outside the scope of his expert report. Plaintiff objects to Defendant calling Dr. Ogenstad to the extent that his testimony was not properly, timely, and sufficiently disclosed during fact or expert discovery pursuant to Federal Rules of Civil Procedure 26 and 37.

B. Specific Objections to Fact Witnesses

27. **Jason Adair.** Plaintiff objects to Defendant calling Mr. Adair by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff objects to the use of Mr. Adair's redirect examination deposition testimony pursuant to Federal Rule of Evidence 611(b) because Mr. Adair's redirect examination deposition testimony is outside the scope of direct examination. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Adair's deposition by Defendant.

28. **David Barton.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Barton's deposition by Defendant.

29. **Greg Bottorff.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Bottorff's deposition by Defendant.

30. **Dean Bunce.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Bunce's deposition by Defendant.

31. **Noah Byrd.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Byrd's deposition by Defendant.

32. **Kiernan Deangelis.** Plaintiff objects to Defendant calling Dr. Deangelis by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Deangelis's deposition by Defendant.

33. **Chunqin ("C.Q.") Deng.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Deng's deposition by Defendant.

34. **Marina Faria-Urbina.** Plaintiff objects to Defendant calling Dr. Faria-Urbina by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Faria-Urbina's deposition by Defendant.

35. **Kevin Laliberte.** Plaintiff objects to Defendant calling Mr. Laliberte by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Laliberte's deposition by Defendant.

36. **Steven Maebius.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Maebius's deposition by Defendant.

37. **Vijay Nainani.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Nainani's deposition by Defendant.

38. **Kishan Parikh.** Plaintiff objects to Defendant calling Dr. Parikh by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff

reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Parikh's deposition by Defendant.

39. **Brian Patterson.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Patterson's deposition by Defendant.

40. **Cynthia Leigh Peterson.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Peterson's deposition by Defendant.

41. **Rajan Saggar.** Plaintiff objects to Defendant calling Dr. Saggar by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32 and because of the conflict posed by Defendant's lawyers representation of him at his deposition advising him regarding his confidentiality agreements with Plaintiff. Plaintiff objects to the use of Dr. Saggar's redirect examination deposition testimony pursuant to Federal Rule of Evidence 611(b) because Dr. Saggar's redirect examination deposition testimony is outside the scope of direct examination. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Saggar's deposition by Defendant.

42. **Rajeev Saggar.** Plaintiff objects to Defendant calling Dr. Saggar by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff objects to the use of Dr. Saggar's redirect examination deposition testimony pursuant to Federal Rule of Evidence 611(b) because Dr. Saggar's redirect examination deposition testimony is outside the scope of direct examination. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Saggar's deposition by Defendant.

43. **Peter Smith.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Smith's deposition by Defendant.

44. **Shaun Snader.** Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Mr. Snader's deposition by Defendant.

45. **Victor Tapson.** Plaintiff objects to Defendant calling Dr. Tapson by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Tapson's deposition by Defendant.

46. **Janet Tully.** Plaintiff objects to Defendant calling Ms. Tully by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff objects to the use of Ms. Tully's redirect examination deposition testimony pursuant to Federal Rule of Evidence 611(b) because Ms. Tully's redirect examination deposition testimony is outside the scope of direct examination. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Ms. Tully's deposition by Defendant.

47. **Michael Wade.** Plaintiff objects to Defendant calling Dr. Wade by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Wade's deposition by Defendant.

48. **Aaron Waxman.** Plaintiff objects to Defendant calling Dr. Waxman by deposition absent a showing of unavailability pursuant to Federal Rule of Civil Procedure 32. Plaintiff reserves the right to provide objections and counter-designations to any designations of the transcript of Dr. Waxman's deposition by Defendant.

EXHIBIT 8

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS
CORPORATION,

Plaintiff,

v.

LIQUIDIA TECHNOLOGIES, INC.,

Defendant.

C.A. No. 23-00975-RGA-SRF

EXHIBIT 8: PLAINTIFF'S DEPOSITION DESIGNATIONS

As required by District of Delaware Local Rule 16.3(c)(7), Plaintiff United Therapeutics Corporation (“UTC”) may introduce the following deposition testimony at trial, consistent with the Federal Rules of Evidence and Federal Rules of Civil Procedure, subject to objections to admissibility. UTC’s designations are not a waiver of its right to object to Defendant Liquidia Technologies, Inc.’s (“Liquidia’s”) introduction of the same testimony.

The parties’ objections are identified by the following abbreviations:

Code	Objection
403	Prejudice, Confusion, Waste of Time: Probative value is substantially outweighed by unfair prejudice and/or confusion of the issues (FRE 403)
611	Outside Scope of Direct Examination (FRE 611(b))
Arg	Argumentative or attorney argument
AA	Asked and answered
AF	Assumes facts not in evidence
ATTY	Attorney objections not removed
B	Improper bolstering of the credibility of a witness, such as before credibility is attacked (FRE 607, 608, 801(d)(1)(B))
BE	Best Evidence Rule, Original Document, Other Content Evidence (FRE 1001, 1002, 1003, 1004)
CD	Compound
D	Document speaks for itself
E	Improper examination (vague, ambiguous, compound, loaded, leading, harassment, etc.) (FRE 401-403, 602, 611)
FN	Lacks foundation/personal knowledge (FRE 602, 701, 702, 901)
H	Hearsay, including hearsay within hearsay (FRE 801, 802, 805)
ID	Improper/incomplete designation or counter-designation (FRE 401-403, FRCP 32) (e.g., designation is neither a question or testimony, counter-designation should not be considered with designation)
IO	Improper opinion (FRE 701 (lay) or FRE 702/703 (expert))
IH	Improper or Incomplete hypothetical (e.g., assumes facts not in evidence, omits facts, etc.)
L	Leading
LC	Conclusion of Law: Contains conclusions of law
MIS	Misleading, misstates prior testimony, mischaracterizes testimony or evidence, including assuming fact not in evidence (FRE 611(a))
MIL	Subject of pending or agreed-upon MIL or to Court order relating to evidence
N	Nonresponsive
NA	Narrative
Priv	Privileged: Protected from disclosure by the attorney-client privilege and/or work product doctrine (FRE 501, 502)

Q	Colloquy
R	Relevance: Not relevant to any issue to be decided in this case (FRE 401, 402, 403)
S	Speculation
Scope	Testimony by 30(b)(6) designee outside scope of noticed and designated topics; testimony of third party outside scope of subpoena requests
V	Vague/ambiguous/overbroad

I. Rajeev Saggar, M.D. (October 16, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
8:17-21		13:21-14:12	ID, R, 403
12:10-20	ID, R	23:15 - 23:17	R, 403
14:19-15:25	ID, R	23:21 - 24:9	R, 403, FN, H
16:3-15	E, FN	24:12 - 25:9	R, 403, FN, H
16:18-17:2	CD, AA, E, S, V	25:13 - 25:24	R, 403, H
17:5-13	CD, AA, E, S, V	26:3 - 26:5	R, 403, FN, H
20:4-21:11	E, AF, FN, R	29:21 - 30:23	D, R, 403
21:13-19	E, AF, FN, R	31:1 - 34:1	R, 403
21:22-22:14	E, AF, FN, R	34:4 - 34:7	R, 403
26:7-28:25	ID, CD, E, AF, FN, R	34:10 - 35:8	D, R, 403
29:2	ID, CD, E, AF, FN, R	36:24 - 38:18	D, R, 403
29:16-20	AF, E	41:6 - 42:2	R, 403
35:9-12	ID, 403, Arg, B, CD, E, S, R, V	42:6 - 42:20	R, 403
35:16-36:23	ID, 403, Arg, B, CD, E, S, R, V	42:24 - 43:12	R, 403
43:13-17	AF, E, ID	48:1 - 48:12	R, 403
45:11-46:15	403, CD, AF, B, E, R, V	48:14 - 48:20	R, 403
46:18-47:15	403, CD, AF, B, E, R, V	48:23 - 48:24	R, 403
53:4-55:2	403, B, D, E, MIS, FN, R, V, Scope	49:2 - 49:14	R, 403, FN, IO, N, NA
55:5-56:7	403, B, D, E, MIS, FN, R, V, AA, Scope	49:15 - 49:25	R, 403
56:9-58:6	403, 611, B, D, E, MIS, FN, R, V, AA, Scope	50:1 - 50:12	R, 403
58:9-21	403, B, D, E, MIS, FN, R, V, AA, Scope	50:13 - 51:10	R, 403, H
58:25-59:4	403, B, D, E, MIS, FN, R, V, AA, Scope	51:14 - 52:7	N, R, 403
59:7-60:7	403, B, D, E, MIS, FN, R, V, AA, Scope	63:24 - 64:9	R, 403, FN, S, IO, B
60:10-62:25	403, B, D, E, MIS, FN, R, V, AA, Scope	66:2 – 66:18	R, 403
63:3-23	403, B, D, E, MIS, FN, R, V, AA, Scope	66:21 – 67:1	R, 403
64:10-65:12	Scope, LC, 403, Arg, B, CD, E, R, V	72:18 - 73:15	N, R, 403
65:16-66:1		73:18 - 75:9	N, R, 403
67:2-69:4	CD, E, MIS, V	75:11 - 75:12	BE, 403

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
69:16-71:20	AF, FN, CD, D, E, R, Scope, V	75:15 - 75:15	BE, R, 403
72:3-7	AF, FN, CD, D, E, R, Scope, V	76:1 - 77:11	N, R, 403
72:10-17	AF, FN, CD, D, E, R, Scope, V	81:15 - 81:20	R, 403, FN, S, IO
75:17-25	AA, AF, FN, CD, D, E, R, Scope, V	81:23 - 81:25	R, 403, FN, S, IO
77:12-15	AA, AF, FN, CD, D, E, R, Scope, V	82:1 - 82:11	R, 403, FN, S, IO
77:18-78:12	AA, AF, FN, CD, D, E, R, Scope, V, MIS	85:5 - 85:11	ID, N, R, 403
78:15-79:3	AA, AF, FN, CD, D, E, R, Scope, V, MIS	85:24 - 85:25	ID, N, R, 403
79:6-13	AA, AF, FN, CD, D, E, R, Scope, V, MIS	86:2 - 86:2	ID, N, R, 403
79:15	AA, AF, FN, CD, D, E, R, Scope, V, MIS	88:21 - 88:23	R, 403
79:22-80:7	403, AF, FN, E, R, V	89:1 - 89:10	N, R, 403
80:10-81:14	403, AF, FN, E, R, V, NA	89:13 - 90:5	N, R, 403, IO
82:13-16	403, AF, FN, E, R, V, AA	90:8 - 90:9	R, 403
82:18-84:22	403, AF, FN, E, R, V, NA	91:12 - 91:21	N, BE, R, 403
84:24-85:3	403, AF, FN, E, R, V	91:24 - 91:25	ID, R, 403
85:12-14	403, AF, FN, E, R, V	92:1 - 92:6	ID, R, 403
85:17-22	403, AF, FN, E, R, V	92:9 - 92:13	N, R, 403
86:4-87:25	403, AF, FN, E, R, V, AA, Scope, MIS	92:16 - 92:18	N, R, 403
88:4-20	403, AF, FN, E, R, V, AA, Scope, MIS, CD	93:20 - 94:9	ID, D, R, 403
90:11-91:11	403, AA, CD, E, FN, AF	97:8 - 97:10	ID, N, D, R, 403
93:15-19		105:18 - 105:20	D, R, 403
95:9-96:21	AA, D, E, CD, R, Scope, V	105:24 - 106:14	D, R, 403
96:24-97:1	AA, D, E, CD, R, Scope, V	106:18 - 107:6	D, R, 403
97:11-98:4	CD, D, E, R, V	107:9 - 107:23	D, R, 403
98:11-100:3	FN, D, AF, AA, 403	108:1 - 109:2	D, R, 403
100:6-104:19	FN, D, AF, AA, 403, R, NA, Priv	109:5 - 109:8	D, R, 403
105:1-17	FN, D, AF, AA, 403, R	111:7 - 111:10	D, R, 403
109:10-20	FN, D, AF, AA, 403, R, Priv	111:14 - 111:22	D, R, 403
109:24-110:5	FN, D, AF, AA, 403, R, Scope, LC, Priv	112:1 - 112:14	D, R, 403

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
110:12-111:2	FN, D, AF, AA, 403, R, Scope, LC	112:23 - 113:2	D, R, 403
111:4-5	FN, D, AF, AA, 403, R, Scope, LC	113:4 - 113:15	D, R, 403
113:24-115:25	AA, CD, 403, AF, FN, R, MIS, D	116:5 - 116:15	D, R, 403
116:2-3	AA, CD, 403, AF, FN, R, MIS, D	116:17 - 117:25	N, D, R, 403
118:9-16	Scope, B, R, E, V, 403, Arg, D	118:2 - 118:7	D, R, 403
118:20-25	Scope, B, R, E, V, 403, Arg, D	125:5 - 125:14	R, 403
119:2-9	Scope, B, R, E, V, 403, Arg, D	131:15 - 131:23	D, R, 403
119:12	Scope, B, R, E, V, 403, Arg, D	131:25 - 131:25	D, R, 403
125:15-130:11	CD, Scope, R, E, V, MIS	132:4 - 132:6	D, R, 403
130:14-131:14	CD, Scope, R, E, V, MIS	132:9 - 132:10	D, R, 403
146:7-150:10	AF, CD, D, R, E, V, FN, B, Scope	176:24 - 177:12	ID, R, 403
150:14-152:17	AF, CD, D, R, E, V, FN, Scope	178:7 - 179:8	R, 403
152:20-153:25	AF, CD, D, R, E, V, FN, B, Scope	179:11 - 180:5	R, 403
168:14-171:2	CD, B, Scope, R, E, V, AF, FN	180:22 - 182:24	R, 403
171:5-8	CD, B, Scope, R, E, V, AF, FN	183:3 - 183:10	R, 403
171:11-20	CD, B, Scope, R, E, V, AF, FN	183:13 - 183:22	R, 403
171:23-172:13	CD, B, Scope, R, E, V, AF, FN	183:25 - 184:23	R, 403
172:17-176:23	CD, B, Scope, R, E, V, AF, FN, ATTY	190:6 - 190:8	R, 403
177:22-178:6		190:12 - 190:23	R, 403, IO
180:9-21		197:25 - 198:9	R, 403
184:24-189:24	CD, B, Scope, R, E, V, AF, FN, D	199:4 - 199:10	ID, R, 403
190:3-4	CD, B, Scope, R, E, V, AF, FN, D	199:25 - 200:6	ID, R, 403
191:2-197:2	AF, FN, D, R, E, V, CD, AA, MIS	200:15 - 200:24	R, 403

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
197:4-16	AF, FN, D, R, E, V, CD, AA, MIS	201:2 - 201:9	R, 403
197:20-23	AF, FN, D, R, E, V, CD, AA, MIS, Scope	202:8 - 202:11	611, L, BE, D, R, 403, FN, IO
208:17-209:25	AF, FN, D, R, E, V, CD, AA, Scope, 403, B	202:14 - 203:1	N, 611, L, BE, D, R, 403, FN
210:4-12	AF, FN, D, R, E, V, CD, AA, Scope, 403, B	204:5 - 204:7	ID, R, 403
210:14-19	AF, FN, D, R, E, V, CD, AA, Scope, 403, B	204:15 - 205:8	ID, N, R, 403, FN, S, H, IO
210:21-211:6	AF, FN, D, R, E, V, CD, AA, Scope, 403, B	206:7 - 206:10	R, 403
211:15-213:6	AA, AF, FN, CD, Scope, 403, R, E, V, MIS, IH	206:13 - 206:18	ID, R, 403, FN, S, IO
213:10-17	AA, AF, FN, CD, Scope, 403, R, E, V, MIS	206:20 - 206:25	R, 403
213:20-214:4	Scope, CD, R, E, FN, AF, IH	207:1 - 207:9	R, 403, FN, S, IO
214:8-215:3	Scope, CD, R, E, FN, AF, IH, NA	207:10 - 207:25	R, 403
215:7-8	Scope, CD, R, E, FN, AF, IH	208:1 - 208:14	R, 403
218:11-220:21	AA, E, NA, R, V	217:2 - 217:5	L, R, 403, E
		217:7 - 218:5	L, D, R, 403, FN, S, IO, E, NA
		218:6 - 218:10	611, L, D, R, 403, FN, S, IO, E
		220:22 - 221:6	L, R, 403, FN, S, IO, E, AF, V
		222:3 - 223:1	L, D, R, 403, IO, E, AF
		223:3 - 223:12	L, BE, R, 403, FN
		223:13 - 223:16	L, R, 403, E, AF
		223:18 - 223:19	R, 403, S, FN, BE
		224:10 - 224:15	BE, R, 403
		224:16 - 224:18	611, L, R, 403, FN, S, H, IO, B, E, AF, V
		224:21 - 224:25	ID, 611, R, 403, FN, S, H, IO
		225:1 - 225:1	ID, 611, R, 403, FN, S, H, IO
		225:14 - 225:17	611, L, R, 403, FN, S, H, IO, E, AF, V
		225:19 - 225:22	611, L, R, 403, FN, S, H, IO, E, AF, V, MIS

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
		225:24 - 225:25	ID, 611, R, 403, FN, S, H, IO
		226:1 - 226:8	ID, 611, R, 403, FN, S, H, IO
		226:10 - 226:13	611, L, R, 403, H, IO, B, E, AF, V
		226:15 - 226:25	ID, N, 611, R, 403, FN, S, H, IO, NA
		227:1 - 227:11	ID, N, 611, R, 403, FN, S, H, IO, NA
		228:7 - 228:10	611, L, R, 403, NA, E, AF, V
		228:12 - 228:22	611, R, 403, NA
		232:14 - 232:16	611, L, R, 403, NA, E, AF
		232:18 - 232:20	611, L, R, 403, NA, E, AF
		232:22 - 232:25	ID, 611, L, R, 403, NA, E, AF, V
		233:1 - 233:1	ID, 611, R, 403, NA
		233:3 - 233:10	611, L, R, 403, NA, E, AF
		233:12 - 233:19	611, L, R, 403, NA, E, AF, V
		233:21 - 234:1	611, L, R, 403, NA, E, AF
		234:4 - 234:6	611, L, R, 403, NA, E, AF
		234:8 - 234:18	611, L, R, 403, FN, S, H, NA, E, AF
		234:20 - 235:13	N, 611, L, R, 403, H, IO, NA, E, AF, V
		235:15 - 235:17	611, L, R, 403, H, IO, NA
		250:10 - 250:12	R, 403
		250:14 - 250:20	R, 403, FN, S, IO

II. Janet Tully (October 23, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
6:2-9		10:4 - 10:15	403, D, R, V
9:17-10:3		17:13 - 17:24	403, R
10:16-25		20:9 - 20:23	403, BE, R
11:17-23		37:18 - 37:25	403, BE, R, IO
12:5-16		38:17 - 38:23	403, BE, R
12:20-13:2		51:10 - 51:12	403, BE, R, FN, H
16:19-24		52:6 - 52:9	403, R, H
16:25-17:12	ID	53:8 - 53:11	403, R, FN, H
18:22-19:15	ID	53:19 - 53:21	
19:20-20:8	ID	53:24 - 54:1	H
23:20-23	ID	54:2 - 54:3	
24:14-17	ID	54:6 - 54:7	403, FN
27:10-20	V	54:9 - 54:20	403, BE, R, FN, H
27:22-24	V	54:21 - 54:23	403, FN, H
28:2-30:19	R	83:14 - 83:15	
32:18-33:6		83:17 - 83:18	403, R
33:9-11	R	85:17 - 85:19	D
33:13-34:3	R	85:21 - 85:22	403, D, IO, S, V
34:6-22	D, R	86:23 - 86:24	
35:19-25	R	87:2 - 87:3	403, R
36:10-37:1	R	96:4 - 96:21	403, 611, Arg, FN, R, V
38:9-11	V, S		
38:14-15	V S, ID		
38:24-39:1	V		
39:3-11	V		
39:13-20	V		
39:22-40:2	V		
40:4-9	FN		
40:12	FN		
40:14-41:6	D, V		
41:8-13	S, V		
41:16-42:5	S, V		
42:8-12	S, AA, V		
42:17	S, AA, V		
43:5-7	V, S		
43:10-23	V, S		
44:24-45:1			
45:3-12			

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
45:14-21			
45:24-25			
50:21-51:9			
51:18-22			
51:24-52:5			
53:1-7			
53:12-18			
54:24-55:1			
55:4-12			
55:15-22			
56:3-5			
56:7-20			
56:22-23			
58:20-59:5			
59:8-20			
59:22-60:9			
60:10-61:3			
61:4-11			
61:15-20			
61:21-23			
61:24-25			
62:2-5			
62:8-17			
62:19-63:13			
63:15-20			
63:22-64:2			
64:4			
64:22-65:25			
66:4-8			
66:10-67:2			
67:7-12			
67:15-18			
67:25-68:7			
68:10-21			
68:24-69:18			
69:23-71:20			
72:5-9			
72:11-25			
73:3			
73:12-74:4			

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
74:18-22			
75:10-76:1			
76:4-6			
76:8-9			
76:14-17			
76:19-78:10			
78:13-22			
79:1-16			
79:18-80:8			
80:10-15			
80:18-25			
81:2-7			
81:10-18			
81:20-82:2			
82:4-8			
82:11-24			
83:1-5			
83:7-13			
83:20-84:3			
84:5-11			
84:13-14			
84:19-22			
84:24-85:4			
85:6-16	D, V, R		
85:24-25	S		
86:3-10	S		
86:13-14	S		
87:5-7	V		
87:9-16	V, S		
87:19-21	V, S		

III. Jason Adair (December 3, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
7:8-10		18:6-13	
15:15-21		18:21-23	
18:2-5	ID	19:8-16	N, R
18:14-20	ID	27:11 – 28:4	N, R
19:24-20:10		44:22 – 45:1	
27:8-10		45:6-7	
44:2-21	BE, D, ID	45:9-19	IO
44:22-45:1			
45:2-5	BE, D, ID, FN	45:21-22	
45:24-46:1	AF, BE, D, ID, FN	46:14-16	
46:22-23	AF, FN, ID, V	46:19-20	IO, N, S, H
47:1-3	AF, FN, ID, V	47:1-8	N
65:14-20	ID	47:11-16	R, N
68:11-21	ID	47:19 – 48:1	R, N
71:9-18	D, ID	48:3-21	IO
74:6-75:2	ID, Scope, V	48:24 – 49:13	
75:4-16	ID, Scope, V	60:3-16	R
78:2-10	D, ID, Scope	61:20 – 62:5	R
78:20-79:16	D, ID, Scope	65:21 – 66:21	
79:20-80:1	D, ID, Scope	68:22-23	
81:8-12	D, ID, Scope	70:22 – 71:8	
81:15-23	D, ID, Scope, V	71:19-21	
82:1-11	D, ID, Scope, V	72:1-2	N
85:6-10	ID, Scope, V	72:14-15	
92:2-4	Scope	72:17-21	N, IO
92:8-11	Scope	78:11-19	
94:22-95:1	Scope	82:13-15	
95:4-9	Scope	82:20-23	N
103:22-24	ID, Scope	85:11-21	N
108:7-17	D, Scope	85:24 – 86:9	N
108:22-109:1	D, Scope	86:13-17	
111:5-7	D, Scope	86:19-24	
111:20-25	D, R, Scope	87:3-992:13-20	
112:11-15	D, R, Scope	103:1-21	H
112:21-114:8	D, R, Scope	103:25-105:17	N
120:10-20	D, R, Scope	115:24 – 117:9	ATTY, IO, R, N
123:24-124:9	D, R, Scope	124:18-20	

	124:22-25	R
	125:2-4	R
	205:7 – 206:14	L, R, B, V, E, S, FN
	206:16-21	H, V, R, E, S, FN
	206:23 – 207:13	H, V, R, E, S, FN
	207:15 – 208:2	H, V, R, E, S, FN
	208:5-12	H, V, R, ID, E, S, FN
	209:7-18	
	209:20	
	209:21 – 210:3	H, V, R, E
	210:5 – 211:1	H, V, R, E, N, FN
	211:3-6	H, V, R, E, FN
	211:9-13	H, V, R, E, FN

IV. Dean Bunce, Ph.D. (October 29, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
6:21-23		52:16 – 52:22	R, 403, V, MIS, AA
14:9-11			
19:20-22			
19:24-20:3	ID, MIS		
51:10-19	H, R		
51:21-52:6	H, R, LC		
52:8-10	H, R, LC		
52:12-15	H, R, LC		

V. Mariana Faria-Urbina, M.D. (October 11, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
8:16-18		10:23 – 11:6	403, Arg, E, FN, ID, R, Scope, V
37:14-17	403	21:22 – 22:6	403, Arg, AA, BE, CD, E, FN, ID, MIS, R, S, Scope, V
37:19-38:5	403, R (37:19-38:2)	22:19-24	403, Arg, AA, E, FN, H, ID, MIS, R, S, Scope, V
38:7-13		60:15-17	403, R, Scope
38:15-18		114:5-22	403, D, IO
38:20-39:8		143:8-23	403, D, IO
39:11-12	R		
39:14-23	R		
39:25-40:5	R		
40:7	R		
46:15-25			
47:13-15			
47:17-49:7			
49:9-13			
49:17-21	ATTY, R		
49:23-50:8	ATTY, R		
50:13-18	R		
50:20	R		
59:24-25			
60:2-13			
61:1	R		
61:3-7	R		
61:9-11	R		
61:13-16	R		
61:18-21	R		
61:23-62:2	R		
62:4-8	R		
62:10-14	R		
62:16-23	R		
62:25-63:4	R		
63:6-9	R		
64:22-65:3	R		
79:3-18			
83:17-84:3			
84:5-10			

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
84:12-15			
84:17-22			
84:24-85:1	R		
85:3-6	R		
85:8-12	R		
85:14-18	R		
85:20-23	R		
86:18-21	R		
86:23-87:8	R (86:23-87:4)		
87:10			
88:23-25	R		
89:2-4	R		
90:3-10	R		
90:12-22	R		
114:23-25	R		
115:2-3	R		
123:13-18			
144:11-15	R		
144:17	R		
144:19-25	R		
145:9-12	R		
145:14-23	R		
159:12-17			
159:19-160:1			
160:3			
166:12-14	R		

VI. Kishan Parikh, M.D. (September 6, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
5:20-22		14:5 – 14:8	R, 403, V, IO
8:10-12		14:10 – 14:10	R, 403, V, IO
8:19-9:17		14:14 – 15:1	R, 403
10:3-10		36:14 – 36:23	R, 403, H
10:15-21	R	36:24 – 37:3	R, 403, H
12:2-6		41:3 – 41:5	R, 403, V, FN
12:10-13:25		41:7 – 41:8	R, 403, V
15:2-15:6	R, ID	42:5 – 42:8	R, 403, V, MIS
15:8-17:4	R, ID	42:10 – 42:15	R, 403
17:6-17:8	R	42:16 – 42:18	R, 403, V, MIS, IO, D
17:15-18:17	R	42:20 – 42:22	R, 403, V, MIS, IO, D, H
18:25-21:22		42:24 – 43:1	R, 403, V, D, H
22:20-23:13		43:3 – 43:4	R, 403, V, D, H
23:22-24:17		43:7 – 43:9	R, 403
27:14-17		56:5 – 56:5	R, 403, IO
27:20-28:17	R	56:7 – 56:13	R, 403, IO
28:19-20	R	59:24 – 60:1	R, 403, IO, FN
28:22-29:13	R	60:3 – 60:4	R, 403, IO, FN
29:16-22	R	60:16 – 60:19	R, 403, D
29:25-30:4	R	63:7 – 63:12	R, 403, ID, Q, IO, FN, Scope
30:6-7	R	63:15 – 63:24	R, 403, ID, IO, FN, Scope
33:16-18		64:1 – 64:7	R, 403, ID, IO, FN, Scope
33:20-21		64:14 – 64:17	R, 403, ID, IO, FN, Scope
34:10-13		64:19 – 64:22	R, 403, ID, IO, FN, Scope
34:15-21		100:24 – 102:2	R, 403, H, D
35:4-7			
35:9-14			
35:16			
35:19-36:10			
37:4-7			
38:17-39:20	R		
40:23-41:2			
46:3-20	R		

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
51:1-3			
51:5-7			
55:17-56:4	R, ID		
57:4-13	R, ID		
57:14-58:22	R, ID		
58:24-59:4	R, ID		
59:6-11	R, ID		
59:13-15	R, ID		
60:20-61:14	R, ID		
62:19-63:6	R, ID		
64:24-65:3			
65:5-9	R, ID		
68:16-69:9			
69:11-19	R, ID		
70:20-24			
71:1-6	R, ID		
71:10-19	R, ID		
82:9-13			
82:16-22			
83:13-17			
83:19-84:3			
84:5-12			
85:4-7			
85:24-87:17	R		
88:4-14	R		
88:16-90:2	ATTY, R		
90:14-20	R		
90:22-91:11	R		
91:14-93:9	R		
93:11-25	R		
94:7-17	R		
96:15-18	MIS, R, IO, S, 403, 611, L, NA		
96:21-97:6	MIS, R, IO, S, 403, 611, L, NA, AA		
97:10-13	R, IO, S, 403, 611, L, NA, AA		
97:19-100:7	R, IO, S, D, NA, 403, AA, MIS, L		
100:9-100:17	R, 403, IO, L, Arg,		
102:15-19	R		
102:21-103:7	R		

VII. Rajan Saggar, M.D. (September 17, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
8:17-19		22:1-3	R, 403, IO, FN
12:12-20		22:5-9	R, 403
13:1-16:15			
20:1-16			
21:9-21			
21:24-25			
85:11-13			
85:15-18			
112:10-25			

VIII. Rajan Saggar, M.D. (November 20, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
10:11-13		15:12-13	R, 403
15:6-8	403, ID, R	15:15-17	R, 403
15:25-16:8	403, ID, R	15:19-23	R, 403
16:11	403, ID, R	18:11-16	R, 403, H
16:13-19	403, ID, R	20:5-12	R, 403
16:21-23	403, ID, R	23:21 – 24:3	R, 403
17:2-18:9	ID, R	24:4-8	R, 403
18:17-20:4	ID, R	32:16 – 33:1	R, 403
20:13-21:5	ID, FN, R	33:10 – 34:10	R, 403
21:7-13	ID, FN, R	34:17-23	R, 403
21:15-22:19	ID, FN, R, V	35:1-6	R, 403
22:22-23:2	ID, FN, R, V	40:2-14	R, 403
25:5-21	ID, R	40:23 – 41:13	R, 403
26:5-15	ID, FN, S, R, V	47:7 – 48:1	R, 403
26:18-23	ID, FN, S, R, V	49:11-17	R, 403
26:25-27:3	ID, FN, S, R, V	60:20 – 61:6	R, 403
34:11-16	ID, R	88:2-10	R, 403, H
35:13-14	403, R	88:21-25	R, 403
35:20-36:5	403, R	89:14-16	R, 403
36:8-10	403, R, FN	90:8-17	R, 403
36:21-23	403, R, FN	94:10-14	R, 403
37:5-12	403, R, FN	94:17	R, 403
37:15-20	403, R, FN	94:19-23	R, 403
37:24-38:14	403, R, FN	95:2	R, 403
43:12-21	403, R	95:4-7	R, 403, ID
58:3-59:11	403, R	95:9	R, 403, ID
59:17-23	ID, 403, R	95:23 – 96:10	R, 403
60:1-9	ID, 403, R	100:14-17	R, 403
61:7-14	ID, 403, R	100:24 – 101:3	R, 403
61:17-64:25	ID, 403, R	101:7-12	R, 403
65:2	ID, 403, R	122:14-16	R, 403
65:13-66:12	ID, 403, R	129:9-23	R, 403, H
69:5-70:19	ID, 403, FN, R	134:4-16	R, 403
70:23-71:8	ID, 403, FN, R	138:1-3	R, 403
71:10-74:12	ID, 403, FN, R	150:13-22	R, 403
74:14-17	ID, 403, FN, R	151:1	R, 403
74:19-75:18	ID, 403, FN, R	158:11 - 159:7	R, 403
75:20-25	ID, 403, FN, R	174:25 - 175:3	R, 403
76:5-77:3	ID, 403, FN, R, LC	183:22-25	R, 403
77:6-13	ID, 403, FN, R, LC	185:4-15	R, 403

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
77:18-78:14	ID, 403, FN, R, LC	191:16-18	R, 403
78:18-79:14	ID, 403, FN, R	191:20 - 192:5	R, 403
79:17-81:1	ID, 403, FN, R	193:1 - 194:7	R, 403, IO, FN, LC, D
81:4-13	ID, 403, FN, R	194:10-14	R, 403, IO, FN, LC, D
81:15	ID, 403, FN, R	194:17 - 195:2	R, 403
81:19-82:3	ID, 403, FN, R	195:3-4	R, 403, V, FN, IE
82:5-17	ID, 403, FN, R	195:6-8	R, 403, V, FN, IE
82:20-25	ID, 403, FN, R, LC	195:10-12	R, 403, V, FN, IE
83:3-8	ID, 403, FN, R, LC	195:14	R, 403, V, FN, IE
83:10	ID, 403, FN, R, LC	195:16-18	R, 403, V, FN, IE, LC, D
83:15-23	ID, 403, FN, R	195:20-22	R, 403, V, FN, IE, LC, D
83:25-84:12	ID, 403, FN, R, LC	196:8-18	R, 403, Scope, 611
84:15-21	ID, 403, FN, R, LC	197:12-13	R, 403, FN, D, LC, IO, Scope, 611
84:23-85:20	ID, 403, FN, R, LC	197:16-20	R, 403, FN, D, LC, IO, Scope, 611
85:24	ID, 403, FN, R	197:25 - 198:5	R, 403, FN, D, LC, IO, Scope
86:13-15	ID, 403, FN, R, LC	198:8	R, 403, FN, D, LC, IO, Scope, 611
86:20-25	ID, 403, FN, R, LC	198:9-11	ID, R, 403, Scope, 611
87:3	403, R	198:16-19	R, 403, FN, D, Scope, 611
89:1-2	403, R	198:22-23	R, 403, FN, D, LC, IO, Scope, 611
89:4-13	403 R	199:1	R, 403, FN, D, LC, IO, Scope, 611
89:17-90:7	403, R	199:2-12	R, 403, FN, D, Scope, 611
92:13-93:18	403, R	199:16-20	R, 403, FN, D, Scope, 611
95:20-22	ID, R	199:21-22	R, 403, FN, D, Scope, 611
97:4-98:3	403, FN, S, R, V	199:24-25	R, 403, FN, D, LC, IO, Scope, 611
98:5	403, FN, S, R, V	200:2	R, 403, FN, D, LC, IO, Scope, 611

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
98:8-11	403, FN, S, R, V	200:4-7	ID, Scope, 611
98:14-17	403, FN, S, R, V	200:10-13	R, 403, FN, D, IE, Scope, 611
98:20-25	403, FN, S, R, V	200:16	R, 403, FN, D, IE, Scope, 611
99:4-11	403, FN, S, R, V	200:18-19	R, 403, FN, D, LC, IO, Scope, 611
99:15-24	403, FN, S, R, V	200:21	R, 403, FN, D, LC, IO, Scope, 611
100:3	403, FN, S, R, V	200:22 - 201:4	R, 403, FN, D, IE, Scope, 611
102:7-103:4	403, R	201:8	R, 403, FN, D, IE, Scope, 611
104:9-11	403, R	201:10-11	R, 403, FN, D, LC, IO, Scope, 611
105:23-106:10	403, R	201:13	R, 403, FN, D, LC, IO, Scope, 611
107:20-109:14	403, FN, R	201:15-21	R, 403, FN, D, IE, Scope, 611
109:16-25	403, FN, R	201:24	R, 403, FN, D, IE, Scope, 611
111:12-113:23	403, FN, R	202:1-2	R, 403, FN, D, LC, IO, Scope, 611
113:25-115:6	403, FN, R	202:4	R, 403, FN, D, LC, IO, Scope, 611
115:13-117:12	403, FN, R	202:6-9	R, 403, ID, Scope, 611
117:16-119:3	403, FN, R	202:13-15	R, 403, FN, D, IE, Scope, 611
120:8-121:18	403, E, R, FN, ID	202:18	R, 403, FN, D, IE, Scope, 611
124:8-125:3	403, R	202:20-21	R, 403, FN, D, LC, IO, Scope, 611
125:9-22	403, R	202:23	R, 403, FN, D, LC, IO, Scope, 611
128:20-129:8	403, R, ID	202:25 - 203:6	R, 403, FN, D, IE, Scope, 611
129:24-130:4	403, R, ID, FN	203:10	R, 403, FN, D, IE, Scope, 611
130:7-15	403, , R, ID, FN	203:12-13	R, 403, FN, D, LC, IO, Scope, 611
130:18-132:6	403, R, ID, FN	203:15	R, 403, FN, D, LC, IO, Scope, 611

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
132:8-133:5	403, R, ID, FN, V, MIS		
133:9	403, R, ID, FN, V, MIS		
133:14-134:3	403, R, ID, FN, V, MIS		
134:17-19	403, R, ID, FN, V, MIS		
134:21	403, R, ID, FN, V, MIS		
134:23-135:6	403, R, ID, FN, V, MIS		
135:12-137:15	403, R, ID, FN, V, MIS		
137:18-19	403, R, ID, FN, V, MIS		
137:21-24	403, R, FN, V, MIS		
138:4-16	403, R		
139:16-140:4	403, R		
140:9-141:15	403, R		
141:19-142:23	403, R, FN		
143:1-6	403, R, FN		
144:4-17	403, R		
145:20-146:1	403, R		
147:25-148:12	403, R		
149:14-150:12	403, R, ID		
151:3-10	403, R, FN		
151:13-19	403, R, FN		
151:23	403, R, FN		
152:6-9	403, R		
152:17-154:25	403, R		
155:9-20	403, R		
156:4-158:10	403, R		
159:11-161:3			
161:14-163:2			
173:1-18	403, ID, R		
174:2-24	403, ID, R		
175:8-19	403, ID, R		
182:25-183:13	403, E, R, ARG, Q		
184:23-185:3	403, E, R, ARG, Q		

IX. Rajan Saggar, M.D. (April 11, 2025)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
7:12-15			
12:24-13:5			
13:8-25			
14:20-15:2	FN		
15:5	FN		
15:10-18:8	FN		
18:10-19:7			
19:13-23			
20:5-13	403, R, FN, MIS		
20:16-24:3	403, R, FN, MIS		
24:6-11	403, R, FN, MIS		
24:13-20	403, R, FN, MIS		
24:25-27:17	403, R, MIS, ID, FN		
27:20-28:19	403, R, MIS, ID, FN		
29:1-11			
29:22-24			
30:14-32:22	R, FN, V		
32:24-33:17	R, FN, V		
33:21-34:9			
34:21-38:3	R, FN, V		
38:9-40:6	R, FN, V		
40:8	R, FN, V		
40:11-12	R, FN, V		
40:14-16	R, FN, V, ID		
42:10-24	R, FN, V		
43:12-44:1	403, R		
44:16-46:6	403, R		
47:12-25	403, R		

X. Victor Tapson, M.D. (November 5, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
14:4-16		19:12-16	403, V, S
15:1-14		25:18 – 26:4	403, V, S, IH, IO
18:3-7		26:6-9	403, V, S, IH, IO
18:9-13		134:18-21	D, H, S, IO
19:3-10		134:22-23	D, H, S, IO
19:17-25		134:25 – 135:8	D, H, S, IO
20:2-3		141:5-15	D, H, IO
25:5-6		141:17 – 142:12	D, H, IO
25:8-17			
41:22-25			
42:2-13			
42:18-19			
42:21-43:6			
54:11-14			
54:16-55:1			
56:22-57:7			
66:14-16			
66:18-67:2			
67:4-9			
75:2-4			
75:6-9			
119:18-20			
119:22-25	IO, R		
133:12-19			
133:21-134:16	403, FN, IO, R, S		
136:16-23			
137:10			
137:12-25			
138:2-6	N, R		
140:15-141:4			
142:13-143:4	R		
154:14-155:16	IO, L, V		
155:19-156:25	FN, IO, L, V, N, NA		
157:3-13	FN, IO, L, V, N, NA		
158:2-5	ID, IO, L, LC, S, V		
158:9-159:9	ID, IO, L, LC, NA, S, V		
159:11-18	IO, L, LC, NA, S, V		

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
160:4-8	IO, L, LC, V		
160:10-15	IO, LC, V		

XI. Kevin Laliberte (November 8, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
6:2-4		20:19-20	403, R, E, ID, S, FN, V
10:12-21		27:5-6	403, R, E, S, FN, V
11:4-20		44:4-11	403, R, H, MIS, S, E
11:24-13:6		44:19-22	403, R, BE, D, H, MIS, E, FN
13:9-14:2		54:7-12	403, R, E, S, FN
14:9-15:2		54:17-22	D, E, S, FN, LC, V
15:5-16:12		54:23 – 55:3	403, R, E, S, FN, LC
16:23-17:3		57:21 – 58:2	403, E, S, FN, LC
17:7-18		62:6-9	403, R, V
17:21-18:9		63:13 – 64:10	403, BE, E, S, FN, V
18:13-19:7		65:8-11	403, R, E, S, FN
19:11-17		87:7-13	E, S, FN, H
20:14-18	R	87:23-24	E, S, FN
21:23-22:5		93:17-19	E, S, FN
22:20-23:14		94:10-12	D, H, E, S, FN
23:24-24:12		94:18-19	D, H, ID
24:19-25:7		95:21 – 96:2	D, H, LC
25:10-25:22	R	97:9-11	403, D, H, LC, S
26:11-27:4	R	98:4-7	D, H, LC, S, V
27:7-15	R	110:11-12	403, R, BE, D, H, ID, S
27:20-25	R	133:7-10	403, BE, D, H, S, LC, V
28:3-9	R	134:18-21	403, BE, D, H, S, LC, V
29:2-5			
29:11-16			
29:20-30:16			
30:21-31:12			
31:15-32:7			
32:24-33:11			
34:3-6			
34:22-24			
35:3-5			
35:9-36:6			
36:21-37:1			
37:9-13			
40:24-41:5			

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
43:1-20	R		
46:23-47:5			
53:25-54:6	R		
54:13-16	ID, R		
55:4-9	ID, R		
55:12-56:2	ID, R		
57:13-20	ID, R		
58:3-59:18	ID, R		
60:15-21	R		
61:21-62:5	R		
62:10-16	R		
62:18-63:3	ID, R		
63:9-12	ID, R		
64:11-65:7	ID, R		
66:8-10	R		
66:13-18	R		
67:1-68:8	R		
68:11-13	R		
68:18-21	R		
69:6-12	R		
74:19-25	403, R		
80:5-7			
80:16-18			
81:20-82:1			
82:3-14	R		
82:18-20	R		
82:25-83:11	R		
83:14-25	R		
84:5-6	R		
84:18-85:3	R		
85:8-20	R		
86:6-8	R		
86:10-20	R		
86:24-87:6	R		
87:14-22	R		
87:25-88:1	R		
88:23-89:3	R		
89:7-90:10	R		
90:15-23	R		
91:6-10	R		
91:12-16	R		
91:23-92:1	R		

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
92:3-19	R		
92:25-93:16	R		
93:20-94:2	R		
94:5-9			
94:13-15	ID, R		
94:20-95:15	ID, R		
96:3-5	ID, R		
96:13-23	ID, R		
97:12-98:3	ID, R		
98:8-11	ID, R		
100:16-19	R		
100:21-101:14	R		
105:14-23	R		
106:2-13	R		
107:3-9	R		
108:16-109:7			
109:12-110:1			
110:4-6			
110:17-20			
111:4-9			
111:13-16			
112:7-9			
116:19-21	R		
117:1-119:8			
119:11-18			
119:22-120:6			
120:10-17			
120:22-23			
121:23-122:16			
122:19-21			
123:4-10			
123:15-19	R		
123:23-124:17	R		
124:20-21	R		
125:2-10			
125:13-16			
125:24-126:9			
126:20-127:10			
127:17-128:15			
128:21-24			
129:19-130:9	R		
131:23-132:1	R		

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
132:3-133:1	R		
133:4-6	R		
133:11-134:6	R		
134:10-17	R		
134:22-23	R		

XII. Michael Wade, Ph.D. (November 8, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
6:10-14		13:10-13:7	R, 403, FN
10:19-25	ID	14:14-14:23	R, 403, FN
13:18-20	R, ID	41:2-41:12	R, 403, Q, D, BE, H
14:11-13	R, ID	42:4-43:2	R, 403, D, BE, H, IO
17:24-18:2		75:13-75:18	R, 403, ID, CD, V, E
18:8-13		75:20-76:8	R, 403, ID, FN, S, AA, V, E, IO
20:11-14		76:11-76:18	R, 403, ID, FN, S, IO
21:8-22:1	R	79:16-79:18	R, 403, ID, V, IO
30:21-31:1		79:20-80:4	R, 403, ID, FN, V, IO
31:3-11	R	80:6-81:6	R, 403, ID, FN, D, BE, H, V, E, IO
31:13-24		81:8-81:12	R, 403, ID, S, IO, V, H
32:1-7		81:19-81:22	R, 403, ID, H, FN, S, V, IO
32:9-12	ID	81:24-82:16	R, 403, ID, S, D, BE, H, IO
41:13-15	ID	82:18-83:1	R, 403, ID, IO, S, V
41:17-42:3	ID	83:3-84:1	R, 403, ID, D, BE, H, IO, V, S
43:3-8		84:3-84:8	R, 403, ID, FN, S, IO
43:10-19	R, ID, 403, NA		
73:23-75:1	R, ID		
75:3-8	R, ID		
75:10-11	R, ID		
76:19-22	R, ID		
76:24-77:1	R, ID		
78:16-23	R, ID		
78:25-79:5	R, ID		
79:7	R, ID		

XIII. Kiernan DeAngelis, M.D. (November 15, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
6:7-9		26:9-26:12	403, BE, R, V
7:9-12		26:14-26:18	403, BE, H, R, V
8:23-9:9		26:20-26:21	403, BE, H, R, V
13:12-19		36:18-37:4	403, BE, S, V
14:15-15:3		37:16-37:18	403, BE, D
15:19-16:12		37:20-38:6	403, BE, D
16:15-17:8			
21:21-25			
23:10-24:16			
25:10-22			
25:25-26:5	ID		
26:7	ID		
27:11-21			
28:6-8			
28:15-29:1			
29:2-30:7			
30:8-30:25			
31:3-14			
31:16-25			
34:17-19	R, ID		
34:21-35:6	R, ID		
35:8	R, ID		
48:20-21			
48:23-49:11			
49:13-16			
49:18			

XIV. Aaron Waxman, Ph.D. (December 12, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
6:10-11		13:1-5	IH, IO
12:2-25		71:7-12	R, D, H
132:12		71:14-24	R, D, H
132:14		96:5 – 96:6	
132:24-25		109:10-11	D, H, IO
133:2		132:15	V, FN
223:17-224:11	403, NA, R	132:17-20	V, FN
		144:16-19	R, V, H
		186:12-18	403, D, MIS, V, CD
		186:20-22	403, D, MIS, V, CD

XV. Stephen Maebius, Ph.D. (October 31, 2024)

UTC's Designations	Liquidia's Objections to UTC's Designations	Liquidia's Counter-Designations	UTC's Objections to Liquidia's Counter-Designations
5:17-19		95:10 – 95:14	R, 403, V, LC
8:18-22			
9:9-11:9			
13:1-6			
95:15-18			
96:2-5	N, R, V,		
106:3-8	N, R, V,		
108:9-16	N, R, V, MIS		
109:6-18	N, V, MIS, NA,		
133:20-134:1			

EXHIBIT 9

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

)
UNITED THERAPEUTICS CORPORATION,)
Plaintiff,) C.A. No. 23-975-RGA-SRF
v.)
LIQUIDIA TECHNOLOGIES, INC.,)
Defendant.)
)
)
)

LIQUIDIA'S DEPOSITION DESIGNATIONS

As required by District of Delaware Local Rule 16.3(c)(7), Defendant Liquidia Technologies, Inc. (“Liquidia”) may introduce the following deposition testimony at trial, consistent with the Federal Rules of Evidence and Federal Rules of Civil Procedure, subject to objections to admissibility. Liquidia’s designations are not a waiver of any right to object to Plaintiff United Therapeutic Corporation’s (“UTC’s”) introduction of the same testimony.

UTC’s objections to Liquidia’s designations, and Liquidia’s objections to UTC’s counter-designations, are identified by the following abbreviations:

Code	Objection
403	Prejudice, Confusion, Waste of Time: Probative value is substantially outweighed by unfair prejudice and/or confusion of the issues (FRE 403)
611	Outside Scope of Direct Examination (FRE 611(b))
Arg	Argumentative or attorney argument
AA	Asked and answered
AF	Assumes facts not in evidence
ATTY	Attorney objections not removed
B	Improper bolstering of the credibility of a witness, such as before credibility is attacked (FRE 607, 608, 801(d)(1)(B))
BE	Best Evidence Rule, Original Document, Other Content Evidence (FRE 1001, 1002, 1003, 1004)
CD	Compound
D	Document speaks for itself
E	Improper examination (vague, ambiguous, compound, loaded, leading, harassment, etc.) (FRE 401-403, 602, 611)
FN	Lacks foundation/personal knowledge (FRE 602, 701, 702, 901)
H	Hearsay, including hearsay within hearsay (FRE 801, 802, 805)
ID	Improper/incomplete designation or counter-designation (FRE 401-403, FRCP 32) (e.g., designation is neither a question or testimony, counter-designation should not be considered with designation)
IO	Improper opinion (FRE 701 (lay) or FRE 702/703 (expert))
IH	Improper or Incomplete hypothetical (e.g., assumes facts not in evidence, omits facts, etc.)
L	Leading
LC	Conclusion of Law: Contains conclusions of law
MIS	Misleading, misstates prior testimony, mischaracterizes testimony or evidence, including assuming fact not in evidence (FRE 611(a))
MIL	Subject of pending or agreed-upon MIL or to Court order relating to

EXHIBIT 9

	evidence
N	Nonresponsive
NA	Narrative
Priv	Privileged: Protected from disclosure by the attorney-client privilege and/or work product doctrine (FRE 501, 502)
Q	Colloquy
R	Relevance: Not relevant to any issue to be decided in this case (FRE 401, 402, 403)
S	Speculation
Scope	Testimony by 30(b)(6) designee outside scope of noticed and designated topics; testimony of third party outside scope of subpoena requests
V	Vague/ambiguous/overbroad

EXHIBIT 9**I. David Barton (November 14, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
5:3 - 5:12		25:14-20	25:14-20 R
6:11 - 6:12		26:16-27:3	26:16-27:3 R
6:18 - 6:19		28:10-17	28:10-17 H
7:22 - 8:18		29:1-2	29:1-2 ID, H, R
9:5 - 9:12	FN, V	32:22-33:4	32:22-33:4 ID, H, R
21:19 - 22:9	403, D, H, R	34:6-8	34:6-8 ID, H, R
22:8 - 22:9	403, H, FN, R	45:9-25	45:9-25 ID, R
28:24 - 28:25	FN, R	46:21-23	46:21-23 ID, H, R
33:5 - 34:5	403, CD, E, FN, R, IO, S, V, Scope	118:15-22	118:15-22 R, 403, ID
35:14 - 36:12	403, D, H, E, FN, R	124:22-125:9	124:22-125:9 H, R, ID
38:24 - 39:10	403, D, H, E, FN, R, IO, S, V, Scope	138:16-23	138:16-23 H, R, ID
40:20 - 41:3	403, D, H, E, FN, R, IO, S, V, Scope	166:21-22	166:18-19 ID, R
41:4 - 41:8	403, D, H, E, FN, R, IO, S, Scope, V	166:24-167:2	166:21-22 ID, R
41:15 - 41:18	403, D, H, E, FN, R, IO, S, V, Scope	174:21-175:2	166:24-167:2 ID, R
41:20 - 42:9	403, D, H, E, FN, R, IO, S, V, Scope	177:11-14	174:21-175:2 ID, R
42:10 - 42:22	403, D, H, E, FN, R, IO, S, V, Scope		177:11-14 ID, R
111:21 - 111:22	D		
113:15 - 114:5	403, D, H, E, FN, R, S, V		
164:5 - 166:15	403, D, H, E, FN, R, S, V, Scope		
167:13 - 167:22	403, D, H, E, FN, R, V, Scope		
174:1 - 174:2	D		
177:15 - 178:17	403, D, H, E, FN, S, R, Scope		

EXHIBIT 9**II. Gregory Bottorff (November 12, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
6:16 - 6:18		30:2-10	30:2-10 ID, R
16:2 - 16:11		30:12-13	30:12-13 R
31:12 - 31:19	R, 403, ID, Scope, FN, IO	31:24-32:3 32:5-7 48:24-25 49:2-4 49:6-9 105:14-17 105:19-24 130:2-5 130:7-10 131:1-2 131:4-7 134:20-21 134:23 135:11-16 135:20-21 136:19-21 136:23 141:3-6 142:25-143:3 146:19-20 146:22-147:1 147:3-5 201:19-202:6 202:8-18 212:22-25 213:24-25 214:2-3 244:9-11 244:13-15 244:17-21 244:23-245:2	31:24-32:3 ID, N, R 32:5-7 ID, N, R 48:24-25 R 49:2-4 N, R 49:6-9 N, R 105:14-17 N, R 105:19-24 N, R 130:2-5 N, R 130:7-10 N, R 131:1-2 131:4-7 134:20-21 ID, N, R 134:23 ID, N, R 135:11-16 135:20-21 136:19-21 136:23 141:3-6 142:25-143:3 146:19-20 ID, N, R 146:22-147:1 147:3-5 201:19-202:6 202:8-18 212:22-25 213:24-25 214:2-3 244:9-11 244:13-15 244:17-21 244:23-245:2
31:21 - 31:22	R, 403, ID, Scope, FN		
32:13 - 32:15	R, 403, ID, Scope, V		
32:19 - 32:21	R, 403, ID, Scope, S		
130:11 - 130:13	R, 403, ID, Scope, IO, V		
130:15 - 130:21	R, 403, ID, Scope, IO, V		
130:23 - 130:24	R, 403, ID, Scope, IO		
134:4 - 134:16	R, 403, ID, Scope, V, AF		
134:18 - 134:18	R, 403, ID, Scope, FN		
135:23 - 135:25	R, 403, ID, Scope, V, AF		
136:2 - 136:2	R, 403, ID, Scope, FN		
136:4 - 136:4	R, 403, ID, Scope, V, AF, S, FN		
136:6 - 136:7	R, 403, ID, Scope, S, FN		
136:9 - 136:10	R, 403, ID, Scope, V, AF, S, FN		
136:12 - 136:12	R, 403, ID, Scope, S, FN		
136:14 - 136:18	R, 403		
136:25 - 137:3	R, 403, ID, V, AF, MIS		
137:5 - 137:6	R, 403, ID, S		
137:10 - 137:12	R, 403, ID, Scope, V		
137:14 - 137:16	R, 403, ID, Scope		
137:19 - 137:20	R, 403, ID, Scope, V		
137:22 - 137:22	R, 403, ID, FN		
138:5 - 138:6	R, 403, ID, Scope, V		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
138:8 - 138:8	R, 403, ID, Scope, FN		202:8-18 ID, R
138:10 - 138:11	R, 403, ID, Scope, AA		212:22-25
138:13 - 138:21	R, 403, ID, Scope, S, FN, V		213:24-25 R
138:23 - 138:24	R, 403, ID, Scope, S, FN		214:2-3 R
139:1 - 139:15	R, 403, ID, V, MIS		244:9-11 ID, N, R
139:17 - 139:18	R, 403, ID		244:13-15 ID, N, R
139:20 - 139:23	R, 403		244:17-21 ID, N, R
140:19 - 141:2	R, 403, D, BE, H		244:23-245:2 ID, N, R
208:3 - 208:17	R, 403, D, BE, H, Q		
208:25 - 209:2	R, 403		
209:19 - 209:20	R, 403		
212:3 - 212:13	R, 403, D, BE, H		
212:14 - 212:21	R, 403		
213:8 - 213:14	R, 403, D, BE, H, ID, V		
213:16 - 213:16	R, 403, ID		
213:18 - 213:23	R, 403		

EXHIBIT 9**III. Dean Bunce (October 29, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
6:21 - 6:23		13:18-23	13:18-23	R
6:24 - 7:1	403, R	14:19-24	14:19-24	
9:15 - 9:17		15:1-4	15:1-4	R
11:23 - 11:24	403, Priv, R	23:1-2	23:1-2	
12:3 - 12:3	403, Priv, R	23:4-8	23:4-8	R
12:15 - 12:23	403, MIS, R	23:10-17	23:10-17	R
13:2 - 13:17	R, V	23:19	23:19	R
14:9 - 14:11	403, R	24:3-7	24:3-7	
14:9 - 14:11	403, R	24:9-13	24:9-13	R
14:15 - 14:18	403, R, V	24:22-24	24:22-24	
15:8 - 15:10	403, BE, ID, R, V	25:1-4	25:1-4	R
15:12 - 15:15	403, BE, ID, R, V	36:1-3	36:1-3	R, H
15:16 - 15:17	403, R, AF, Arg, V	36:5	36:5	R, H
15:19 - 16:7	403, R, AA, MIS, V	42:1-3	42:1-3	
16:9 - 16:11	403, R, V	42:5-8	42:5-8	R, 403, H
16:18 - 16:19	403, AF, R, V, E, FN	42:10-11	42:10-11	R, 403, H
16:21 - 16:23	403, R, E, FN, V	57:5-8	57:5-8	R
18:1 - 18:4	403, R, E, FN, AF, V	59:24-25	59:24-25	R, H
20:24 - 21:2	403, R, E, AF, H, FN, V, LC, Scope	60:2-4	60:2-4	R, H
21:4 - 21:10	403, R, H, BE, D, E, AF, S, V, LC, Scope	62:4-5	62:4-5	R, H
21:12 - 21:16	403, R, BE, D, E, AF, V, LC, Scope	62:7	62:7	R, H
21:18 - 21:20	403, V, BE, D, E, MIS, R, AF, V, LC, Scope	64:10-11	64:10-11	R, H
21:22 - 22:2	403, E, R, FN, V, MIS, H, AF, LC, Scope	64:13-17	64:13-17	R, H,
22:4 - 22:7	403, R, E, FN, V, MIS, AF, LC, Scope	83:9-16	83:18	
22:10 - 22:20	403, BE, R, E, IO, AF, MIS, LC, Scope	83:18	85:8-25	
22:22 - 22:25	403, R, ID, E	85:8-25	87:3-5	
25:9 - 25:13	403, R, V, MIS, AF, E, H, BE, D, S, LC, Scope	87:3-5	87:7-13	
		87:7-13	89:4-14	
		89:4-14	91:23-92:1	
		91:23-92:1	92:3-10	
		92:3-10	92:12-16	
		92:12-16	97:23	
		97:23	97:25-98:2	

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
26:13 - 26:15	403, R, V, MIS, AF, AA, E, LC, Scope		71:25 R, H
26:17 - 26:21	403, R, H, BE, D, E, S, LC, Scope		83:9-16 R, D
27:7 - 27:24	403, R, D		83:18 R, D
27:25 - 28:1	403, R		85:8-25 R, 403, D
28:5 - 28:13	403, R		87:3-5
28:15 - 28:24			87:7-13 R, H
28:25 - 29:18	403, D, R, Priv		89:4-14 R
29:22 - 29:24	403, R		91:23-92:1
29:25 - 30:6	403, Priv, R, V		92:3-10 R
30:8 - 30:10	403, R, S, FN, V		92:12-16 R
30:14 - 30:14	403, E, R, V		97:23 R, 403
30:16 - 30:17	403, R		97:25-98:2 R, 403
33:8 - 33:11	403, R, BE, D		
33:19 - 33:25	403, R, BE, D, H		
34:13 - 34:14	403, R, ID, IO, S, FN, BE, D, MIS, H, LC		
34:16 - 34:19	403, R, S, FN, BE, D, H, LC		
34:20 - 34:21	403, S, FN, BE, D, H, MIS, V, AF, LC		
34:23 - 34:25	403, S, FN, BE, D, H, V, AF, LC		
35:2 - 35:7	403, S, FN, BE, D, H, LC		
35:13 - 35:15	403, AA, BE, ID, R, FN, AF, V, LC		
35:17 - 35:20	403, AA, BE, ID, R, S, FN, LC		
35:21 - 35:25	403, R, S, FN, BE, D, H, LC		
36:6 - 36:11	403, BE, D, H, S, FN, V, AF		
36:13 - 36:21	403, AA, R, S, FN, BE, D, H, AF, V, MIS		
36:23 - 36:24	403, R		
39:14 - 39:20	403, R, S, FN, V, AF, H, BE, D		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
39:22 - 39:24	403, R, H		
40:7 - 40:8	403, E, IO, R, S, FN, V, H		
40:10 - 40:15	403, IO, R, H		
40:25 - 41:6	403, IO, S, FN, BE, D, H, AF, E, V		
41:10 - 41:10	403, R		
41:11 - 41:12	403, R, S, FN, BE, D, H, V		
41:14 - 41:17	403, R, H, IO, S, FN, BE, D, AF		
41:20 - 41:22	403, R, H, AA, AF, MIS		
41:24 - 41:25	403, R, AA		
42:12 - 42:21	403, IO, S, FN, BE, D, H, V		
42:23 - 43:1	403, IO, S, FN, H, V		
43:3 - 43:6	403, IO, S, FN, H, V		
43:8 - 43:9	403, IO, S, FN		
43:13 - 43:13	403, E, IO, V, S, FN		
43:15 - 43:19	403, E, S, FN, H, BE, D, V		
43:21 - 43:23	403, IO, E, S, FN, BE, D, H, AA, V		
43:25 - 44:3	403, S, FN, BE, D, H		
44:4 - 44:6	403, R, V		
44:8 - 44:10	403, R, FN, AF, MIS, V, H		
44:14 - 44:20	403, S, FN, BE, D, H		
44:21 - 44:21	403, R, FN, V, S		
44:23 - 44:24	403, R, FN, S, IO		
46:7 - 46:19	403, S, FN, BE, D, H, AF, V		
46:21 - 46:24	403, AA, S, FN, BE, D, H, MIS, V		
47:1 - 47:2	403, AA, H		
47:12 - 47:15	403, AA, AF, MIS, FN, S, V		
47:17 - 47:19	403, AA, R, AF, V		
47:21 - 47:22	403, R, H		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
47:23 - 48:4	403, AA, S, FN, BE, D, H, AF, V		
48:6 - 48:9	403, H, S, FN, AA, V		
48:12 - 48:12	403, R		
48:13 - 48:14	403, S, FN, AA, V		
48:17 - 48:20	403, AA, R, S, FN, H, V		
48:22 - 48:24	403, AA, R, S, FN, H, V		
49:1 - 49:1	403, R		
52:23 - 53:1	403, MIS, AA, V		
53:3 - 53:3	403, R		
53:4 - 53:4	403, R, AF, V, AA		
53:9 - 53:10	403, R		
53:14 - 53:17	403, R, V, AF		
53:19 - 53:21	403, R, V, AA		
53:23 - 53:25	403, R, D, BE, V		
54:2 - 54:8	403, R, V, IO, D, BE		
54:10 - 54:11	403, R, IO, D, BE		
59:9 - 59:20	403, R, D		
60:5 - 60:7	403, R, BE, D, E, ID, AA		
61:10 - 62:1	403, R, D		
62:8 - 62:8	403, R, AA, Priv		
62:12 - 62:14	403, R, BE, D		
63:14 - 64:7	403, R, D		
64:20 - 64:20	403, R, V		
64:23 - 64:24	403, R, BE, D		
65:18 - 66:6	403, R, D		
66:7 - 67:13	403, R, E, D		
70:19 - 70:25	403, BE, D, H, ID		
71:1 - 71:7	403, S, FN, BE, D, H, ID, AF, V, E, AA		
71:9 - 71:13	403, S, FN, H, BE, IO		
71:14 - 71:16	403, R, S, FN, AF, MIS, H		
71:18 - 71:21	403, R, H		
82:10 - 82:13	403, R, D		
82:20 - 83:4	403, R		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
86:6 - 86:9	403, R, AF, MIS, D, BE, ID		
86:11 - 86:15	403, R, AF, MIS, D, BE, ID, ATTY		
86:16 - 86:19	403, R, Arg, AF, MIS, D, BE, ID, V		
86:21 - 86:21	403, R, D, BE, ID		
91:8 - 91:11	403, R, S, FN, AA, ID, V, E, Scope		
91:14 - 91:16	403, R, LC, Scope		
93:1 - 93:20	403, R, D		
95:21 - 96:14	403, R, V, BE, D		
96:16 - 96:18	403, R, V, BE		
96:20 - 96:23	403, R, V, AF, MIS, BE, D		
96:25 - 97:5	403, R, BE, D, S, FN		
97:6 - 97:7	403, R, IO, FN, E		
97:11 - 97:13	403, R, IO, FN, E		
97:15 - 97:17	403, R, IO, FN, E, D		

EXHIBIT 9**IV. Noah Byrd (October 15, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
5:13 - 5:18		8:23-24	8:23-24	R
21:1 - 22:8	403, R, AF, D, E, FN, V	9:1-8 10:6-7 10:9-11 10:13-15 10:17-20 10:22-24 20:6-19 29:12-14 29:16-30:5 30:7-10 30:12-17 46:19-21 55:2-5 55:8-15 55:18-19 84:11-16 106:1-7	9:1-8	R
22:10 - 23:7	403, R, ID, C, D, E, FN, S, V	10:6-7	R	
23:9 - 23:15	403, R, ID, E, FN, V	10:9-11	R	
23:17 - 23:17	403, R, ID, E, FN, V	10:13-15	10:13-15	R
30:18 - 30:22	403, R, ID, D, IO, E, V	10:17-20	10:17-20	R
30:24 - 31:7	403, R, ID, AF, D, E, FN, IO, S, V, CD, Arg, LC	20:6-19	10:22-24	R
31:10 - 31:15	403, R, ID, AF, E, FN, IO, S, V, LC	29:12-14	20:6-19	R
38:3 - 38:11	403, R, ID, D	29:16-30:5	29:12-14	R
38:13 - 38:23	403, R, ID, D, S, V, IO	30:7-10	29:16-30:5	R
38:25 - 39:3	403, R, ID, D, S, V, IO	30:12-17	30:7-10	R
39:5 - 39:5	403, R, ID, D, S, V, IO	46:19-21	30:12-17	R
40:6 - 40:12	403, R, ID, D, E, IO	55:2-5	46:19-21	R, N
40:15 - 40:16	403, R, ID, D, IO	55:8-15	55:2-5	R, ID, N
41:10 - 41:12	403, R, ID, D, E, IO, CL, FN, AF, V	55:18-19	55:8-15	R, ID, N
41:14 - 41:23	403, R, ID, D, E, IO, CL, FN, AF, V	84:11-16	55:18-19	R, ID, N
42:1 - 42:5	403, R, ID, D, E, IO, CL, FN, AF, V	106:1-7	84:11-16	R, ID
42:12 - 42:14	403, R, ID, BE, E, IO, CL, FN, AF, V, Arg		106:1-7	ID
42:16 - 42:23	403, R, ID, BE, E, IO, CL, FN, AF, Arg			
42:25 - 42:25	403, R, ID, D, BE, E, IO, CL, FN, AF			
43:8 - 43:9	403, R, ID, D, BE, E, IO, CL, FN, AF, V, Arg			

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
43:12 - 43:20	403, R, ID, D, BE, E, IO, CL, FN, AF, V, Arg		
44:4 - 44:15	403, R, D, E, IO, CL, MIS		
44:24 - 45:1	403, R, D, E, IO, CL, V, S		
45:4 - 45:7	403, R, D, E, IO, S		
45:8 - 45:24	403, R, D, IO		
46:1 - 46:1	403, R, D, IO		
46:11 - 46:16	403, R, D, IO, S, FN		
46:18 - 46:18	403, R, D, IO, S, FN		
51:9 - 53:9	403, R, D, IO, E, S, V, MIS		
53:12 - 53:13	403, R, D, IO, E, S, V, MIS		
53:21 - 54:21	403, R, D, IO, E, S, V, MIS		
54:24 - 55:1	403, R, D, IO, E, S, V, MIS		
55:20 - 56:4	403, R, D, IO, E, S, V, MIS		
56:6 - 57:12	403, R, D, IO, E, S, V, MIS		
57:14 - 57:18	403, R, D, IO, E, S, V, MIS		
57:21 - 57:25	403, R, D, IO, E, S, V, MIS		
58:1 - 58:10	403, R, D, IO, E, S, V, FN, MIS		
58:13 - 58:17	403, R, D, IO, E, S, V, MIS		
61:16 - 61:20	403, R, E, IO, FN, V		
61:22 - 61:25	403, R, E, ID, IO, FN, V		
62:2 - 62:3	403, R, E, IO, FN, V		
62:4 - 62:6	403, R, ID		
62:14 - 62:19	403, R, ID		
62:21 - 63:3	403, R, D, IO, FN, V, E		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
63:17 - 64:4	403, R, D, IO, FN, V, E		
64:6 - 64:23	403, R, D, IO, FN, V, E		
64:25 - 65:16	403, R, D, IO, FN, V, E		
65:18 - 66:4	403, R, D, IO, FN, V, E		
66:7 - 66:9	403, R, D, IO, FN, V, E, MIS, FN		
66:12 - 66:16	403, R, D, IO, FN, V, E, FN, S		
67:1 - 67:4	403, R, D, IO, FN, V, E, FN, S		
67:6 - 67:11	403, R, D, IO, FN, V, E, FN, S		
81:10 - 81:19	403, R, D, S, FN		
81:22 - 82:2	403, R, D		
84:5 - 84:7	403, R, ID, IO, MIS		
84:10 - 84:10	403, R, ID, IO, MIS		
84:17 - 85:4	403, R, CD, AF, FN, D, Arg, E, IO, ID		
85:6 - 85:6	403, R, CD, AF, FN, D, Arg, E, IO, ID		
85:11 - 85:19	403, R, CD, AF, D, E, ID		
85:21 - 85:24	403, R, CD, AF, D, E, ID		
86:1 - 86:6	403, R, AF, E, ID, AA, S, FN		
86:8 - 86:11	403, R, AF, E, ID, AA, S, FN		
86:13 - 86:18	403, R, AF, E, ID, AA, S, FN		
86:20 - 86:20	403, R, AF, E, ID, AA, S, FN		
99:16 - 100:1	403, R, D, ID, V, IO		
100:4 - 100:9	403, R, D, ID, IO		
101:17 - 101:18	403, R, S, FN, ID, V		
101:20 - 101:22	403, R, S, FN, V, ID, IO		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
101:25 - 102:5	403, R, S, FN, V, ID, IO		
102:13 - 103:6	403, R, CD, V, E		
103:8 - 103:8	403, R, CD, V, E		
105:3 - 105:5	403, R, V, AA, S, FN, E		
105:7 - 105:11	403, R, V, AA, S, FN, E		
106:12 - 107:10	403, R, ID, D, AF, IO, CD, V, S		
107:12 - 107:18	403, R, ID, D, AF, IO, CD, V, S, MIS		
107:20 - 108:1	403, R, ID, D, AF, IO, V, S, LC		
108:3 - 108:9	403, R, ID, D, AF, IO, V, S, LC		
108:11 - 108:14	403, R, ID, D, AF, IO, V, S, LC		
109:24 - 109:25	403, R, ID, AA, E, AF, S, IO		
110:3 - 110:6	403, R, ID, AA, E, AF, S, H, IO		
110:13 - 110:15	403, R, ID, AA, E, AF, S, H, IO		
110:17 - 110:22	403, R, ID, AA, E, AF, S, H, IO, FN		
110:25 - 111:1	403, R, ID, AA, E, AF, S, H, IO, FN		
111:8 - 111:10	403, R, ID, AA, E, AF, S, H, IO, FN		
111:12 - 111:14	403, R, ID, AA, E, AF, S, H, IO, FN		
111:17 - 111:19	403, R, ID, AA, E, AF, S, H, IO, FN		

EXHIBIT 9**V. Kiernan Thomas DeAngelis (November 15, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
6:3 - 6:4		15:4-18	15:4-18 R
6:3 - 6:4		17:24-18:4	17:24-18:4 R
6:7 - 6:9		19:10	19:10 R
6:10 - 6:12	403, ID, R	19:12	19:12 R
6:10 - 6:12	403, ID, R	19:24-20:21	19:24-20:21 R
8:19 - 8:22		23:10-24:25	23:10-24:25
12:22 - 13:4	403, D, H, Arg	25:25-26:5	25:25-26:5 ID
13:12 - 14:7	403, D, V	26:7	26:7 ID
14:8 - 14:14	403, D, R	28:4-8	28:4-8
14:15 - 15:3	403, D, V	29:18-30:7	29:18-30:7
	403, D, ID, E, FN, H, IO, R, S, V	30:15-20	30:15-20
15:19 - 17:18		33:5-8	33:5-8 R
	403, AF, E, FN, H, ID, MIS, IO, R, S, V	33:10	
18:5 - 18:23		34:17-19	
18:24 - 19:9	403, FN, ID, R, V	34:21-35:6	
	403, BE, E, MIS, R, V	35:8	
21:6 - 21:25		37:16-18	
22:11 - 22:16	403, AA, BE, E, R, V	37:20-23	
	403, AF, BE, FN, ID, R, S, V	47:7-9	
25:8 - 25:22		50:5-13	
26:25 - 27:9	403, BE, D, R	50:15-18	
27:11 - 27:21	403, R, H, V		
28:15 - 29:9	403, BE, D, R, V		
	403, BE, D, MIS, R, V		
30:8 - 30:14			
31:6 - 31:14	403, D, FN, ID, IO, MIS, R, S, V		
31:16 - 32:4	403, D, FN, ID, IO, R, S, V		
35:24 - 36:4	403, D		
36:8 - 36:17	403, D, BE		
39:5 - 39:12	403, D, E, FN, ID, S, V		
39:14 - 39:16	403, D, E, FN, ID, IO, S, V		
40:10 - 40:17	403, D, E, FN, ID, IO, S, V		
44:20 - 45:2	403, D		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
45:5 - 45:14	403, BE, D, FN, ID, R, S, V		
45:16 - 45:22	403, BE, FN, ID, R, S, V		
45:24 - 46:3	403, BE, FN, ID, R, S, V		
48:20 - 48:21	403, AF, BE, FN, ID, R, S, V		
48:23 - 49:11	403, BE, FN, H, R, S, V		
49:13 - 49:16	403, BE, FN, H, R, S, V		
49:18 - 49:22	403, BE, FN, R, S, V		
50:23 - 51:8	403, AF, BE, D, FN, R, S, V		
51:10 - 51:16	403, AF, BE, D, FN, ID, IO, R, S, V		
51:18 - 51:23	403, AF, D, FN, ID, IO, R, S, V		
51:25 - 52:4	403, AF, D, FN, ID, IO, R, S, V		

EXHIBIT 9**VI. Chunqin (CQ) Deng (November 12, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
8:10 - 8:14		25:4-13	25:4-13	ID, R, 403
8:15 - 8:17		26:6-8	26:6-8	R, N
10:4 - 10:6		26:11-20	26:11-20	R, N
12:15 - 16:14	BE, D, R, 403, E, AF, V, MIS, FN, CD, IH, S, H, IO	26:23-27:7 27:11-13 27:15-20 29:18-19 29:21-23 29:25 32:23-25 33:3-7 33:9-13 36:14-16 36:19 36:24-37:1 37:3-15 37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	26:23-27:7	R, N
16:16 - 16:21	R, 403, E, AF, V	27:11-13	27:11-13	R, N
16:23 - 17:1	R, 403, E, AF, V	27:15-20	27:15-20	R, N
17:5 - 17:15	R, 403, E, AF, V	29:18-19	29:18-19	R
17:17 - 17:23	R, 403, AF, V	32:23-25	29:21-23	R
20:5 - 21:4	R, 403, E, AF, V	33:3-7	29:25	R
21:6 - 21:21	BE, R, 403, E, AF, V, MIS, FN, ID	33:9-13 36:14-16 36:19 36:24-37:1 37:3-15 37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	32:23-25	R, N
21:24 - 22:5	R, 403, E, AF, V, FN, S, ID	36:19 36:24-37:1	33:3-7	R, N
22:8 - 22:19	R, 403, E, AF, V, MIS, FN, S, H	37:3-15 37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	33:9-13	R, N
22:21 - 22:25	R, 403, E, AF, V, FN, H	36:14-16 36:19 36:24-37:1 37:3-15 37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	36:14-16	R, N
23:2 - 23:8	R, 403, E, AF, V, MIS, FN, S, H, IO	36:19 36:24-37:1 37:3-15 37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	36:19	R, N
23:10 - 23:18	R, 403, E, AF, V, MIS, FN, IH, S, IO	36:24-37:1 37:3-15 37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	36:24-37:1	R, NA, N
23:21 - 24:8	R, 403, E, AF, V, MIS, FN, IH, S, IO, ATTY	37:3-15 37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	37:3-15	R, NA, N
24:11 - 24:11	R, 403, FN, IH, S, IO	37:23-25 38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	37:23-25	R, N
24:15 - 24:16	R, 403, E, FN, IO, ID	38:3-5 38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	38:3-5	R, N
24:19 - 24:21	R, 403, E, FN, S, IO, ID,	38:7-12 38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	38:7-12	R, N
24:22 - 24:25	R, 403, E, AF, V, MIS, FN, IH, S, IO	38:15-17 38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	38:15-17	R, N
25:3 - 25:3	R, 403, FN, IH, S, IO	38:25-39:3 39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	38:25-39:3	R, N, 403
25:14 - 25:17	R, 403, E, AF, V, MIS, FN, IH, S, IO	39:5-6 40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	39:5-6	R, N, 403
25:20 - 26:5	R, 403, FN, IH, S, IO	40:5-11 40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	40:5-11	R, N
25:20 - 26:5	ID	40:14-16 45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	40:14-16	R, N
27:21 - 27:25	R, 403, E, MIS, FN, H	45:23-46:2 46:4-5 56:10-12 62:8-10 62:12 63:11-13 63:15 64:4-5 64:8-9 66:14-16 66:18-19 67:16-18 67:20-68:4 68:6-17 68:20-21	45:23-46:2	R, N

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
29:7 - 29:9	R, 403, E, V, MIS, ID	68:23-69:1	46:4-5 R, N
30:1 - 30:2	R, 403, E, AF, FN, S	75:22-76:3	56:10-12
30:4 - 30:10	R, 403, E, FN, CD, S, H,	76:6-9 92:24-93:1	62:8-10 N, R
30:12 - 30:16	R, 403, E, AF, MIS, FN, S, H	93:4 99:15-18	62:12 N, R
30:18 - 30:20	R, 403, E, FN, CD, S, H	99:20-101:6 102:18-103:2	63:11-13 N, R
30:22 - 31:5	R, 403, E, ID	103:18-21	63:15 N, R
31:8 - 31:13	R, 403, E, ID	103:23-25	64:4-5 N, R
31:14 - 31:15	R, 403, E, V	108:7-10	64:8-9 N, R
31:17 - 31:23	R, 403, E, V, H	108:12-16	66:14-16 N, R
31:25 - 32:5	R, 403, E, AF, V, S, H	109:7-11 109:13-16	66:18-19 N, R
32:8 - 32:12	R, 403, E, FN, S, H, IO	110:14-18 110:21-111:6	67:16-18 R
32:15 - 32:22	R, 403, E, FN, S, H, IO	111:11-15 111:18-23	67:20-68:4 R, 403
33:23 - 33:25	R, 403, E, AF, V, FN, S	111:25-112:5 131:16-19	68:6-17 R, 403, FN
34:2 - 34:21	R, 403, E, AF, MIS, FN, S, IO	131:21-22 133:1-4	68:20-21 R, 403, N
34:24 - 35:5	R, 403, E, FN, S, H, IO	133:7-8 133:10-16	68:23-69:1 R, 403, N
35:7 - 35:8	R, 403, E, AF, FN, S, IO	137:24-25 138:2	75:22-76:3
35:11 - 35:13	R, 403, E, AF, MIS, FN, S, IO	141:1-5 141:15-18	76:6-9 ID
35:15 - 35:19	R, 403, E, AF, MIS, FN, S, IO	141:22-24 152:24-153:2	92:24-93:1 N, R
35:21 - 35:23	R, 403, E, MIS, FN	153:4-154:5 154:16-20	93:4 N, R
35:25 - 36:3	R, 403, E, AF, MIS, FN, H, IO	154:23-155:7 155:16-18	99:15-18 R
36:5 - 36:10	R, 403, E, AF, FN, H, IO	155:21-156:5 157:7-10	99:20-101:6 R, NA
36:12 - 36:13	R, 403, E, FN, IO	157:13-22	102:18-103:2 R, NA, N
38:18 - 38:21	R, 403, E, AF, MIS, FN, H, IO	158:14-16 158:18-159:6	103:18-21 R
38:24 - 38:24	R, 403, E, FN, S, H, IO	159:22-25	103:23-25 R

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
40:17 - 40:18	R, 403, E, MIS, FN, S, H, IO	160:4-11 161:4-7	108:7-10 R, N
40:20 - 40:22	R, 403, E, FN, S, IO	161:11-23 161:25-162:5	108:12-16 R, N
40:25 - 41:6	R, 403, E, MIS, FN, IO, ID	168:16-169:3 169:5 169:12-14	109:7-11
41:13 - 41:17	R, 403, E, V, FN, S, IO, ID	169:17-170:7 170:9-18	109:13-16
41:19 - 42:4	BE, R, 403, E, FN, IO	170:20-24 171:2-7	110:14-18 R, N
42:6 - 42:13	BE, R, 403, E, FN, H, IO	171:10-14 171:18-172:17	110:21-111:6 R, N
42:16 - 42:19	R, 403, E, AF, MIS, FN	172:20-25 173:3-16	111:11-15 R, 403
42:21 - 43:6	R, 403, E, FN	173:19-174:2 176:3-7	111:18-23 R, 403
48:3 - 48:7	BE, D, R, 403	176:10-177:1 180:25	111:25-112:5 R, N, 403
48:16 - 50:2	BE, D, R, 403, E, V	181:3-16 201:10-14	131:16-19 R, N
50:13 - 50:17	BE, D, R, 403, E, ID	201:17-202:2	131:21-22 R, N
51:22 - 52:1	BE, D, R, 403, E	203:1-3 203:6-10	133:1-4 R, N
52:3 - 52:21	BE, D, R, 403, E, AF, V, FN, S	203:12-18 206:6-9	133:7-8 R, N
52:23 - 53:6	BE, R, 403, E, MIS, FN, S	206:12-16 206:18-22	133:10-16 R, N
53:8 - 53:10	BE, R, 403, E, AF, V, FN, S	207:15-17 207:20-208:2	137:24-25 ID
53:12 - 54:2	BE, R, 403, E, V, FN, S	208:4 210:18-19	138:2 ID
54:13 - 55:4	BE, R, 403, E, AF, V, FN, S	210:21 215:19-21	141:1-5 R, N, Priv
55:6 - 55:9	BE, R, 403, E	215:23-24 220:2-6	141:15-18 R, N, Priv
55:18 - 55:22	BE, R, 403, E, FN, S	220:8-16 221:4-7	141:22-24 R, N
55:24 - 56:9	BE, R, 403, E, AF, MIS, FN, S	221:10-222:5 222:8-11	152:24-153:2 R, N, NA
56:14 - 56:16	R, 403, E, AF, V, FN, S	230:13	153:4-154:5 R, N, NA
56:18 - 57:1	R, 403, E, V, FN, S, IO		154:16-20 R, N, NA
57:3 - 57:21	R, 403, E, MIS, FN, S, H, IO		154:23-155:7 R, N, NA
57:23 - 57:24	R, 403, E, MIS, FN, S, H, IO		155:16-18 R, N, NA

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
58:1 - 58:8	BE, R, 403, E, AF, FN, S, H	230:15 232:8-13 232:15-22 232:24-233:8	155:21-156:5 R, N, NA
58:10 - 58:13	BE, R, 403, E, AF, MIS, FN, S	233:10-12 233:14 233:19-21 233:23-234:8	157:7-10 R, N
58:15 - 58:20	BE, R, 403, E, FN, S	234:10 235:8-11 235:13-17 235:19	157:13-22 R, N
59:2 - 59:16	BE, D, R, 403, E, AF, FN, S	236:7-9 236:11-13 236:15-25 237:2-7	158:14-16 R, N, NA
59:18 - 59:18	BE, R, 403, E, FN, S		158:18-159:6 R, N, NA
60:5 - 60:20	BE, D, R, 403, E, V, FN, S		159:22-25 R, N, NA
60:23 - 61:2	BE, R, 403, E, AF, FN, S, ID		160:4-11 R, N, NA
61:5 - 61:8	BE, R, 403, E, AF, MIS, FN, S, H, IO, LC, ID		161:4-7 R, N, NA
61:10 - 61:12	BE, R, 403, E, FN, S, H,		161:11-23 R, N, NA
61:15 - 61:19	BE, R, 403, E, AF, MIS, FN, S, H, IO		161:25-162:5 R, N, NA
61:22 - 62:4	BE, R, 403, E, AF, V, MIS, FN, S, H, IO		168:16-169:3
62:7 - 62:7	BE, R, 403, E, FN, S, H, IO		169:5
63:16 - 63:17	R, 403, E, AF, V, FN, S		169:12-14 ID
63:19 - 63:23	R, 403, E, AF, V, FN, S		169:17-170:7 ID, N
64:1 - 64:3	BE, R, 403, E, FN, S		170:9-18
64:10 - 64:11	BE, R, 403, E, AF, MIS, FN, S, H, AA		170:20-24
64:14 - 64:16	BE, R, 403, E, AF, FN, S		171:2-7 R
64:19 - 64:25	BE, R, 403, E, AF, FN, S, H		171:10-14 R, N, NA
65:3 - 65:8	BE, R, 403, E, AF, MIS, FN, S		171:18-172:17 R, N, NA
65:18 - 65:22	BE, R, 403, E, AF, V, MIS, FN, S, AA		172:20-25 R, N, NA
65:25 - 66:10	BE, R, 403, E, AF, MIS, FN, S		173:3-16 R, N, NA
66:13 - 66:13	R, 403, E, FN, S		173:19-174:2 R, N, NA

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
66:20 - 66:22	R, 403, E, AF, V, FN, S		176:3-7 R, N, NA
66:25 - 67:5	R, 403, E, AF, V, FN, S		176:10-177:1 R, N, NA
67:7 - 67:15	R, 403, E, FN, S		180:25 R, ID
69:2 - 69:6	R, 403, E, V, FN		181:3-16 R, ID
69:9 - 69:13	R, 403, E, V, FN		201:10-14 ID, 403
69:15 - 69:20	R, 403, E, V, FN		201:17-202:2 ID, R
69:22 - 70:6	R, 403, E, FN		203:1-3
71:14 - 71:22	BE, R, 403, E, V		203:6-10
71:24 - 72:20	BE, D, R, 403, E, AF, V		203:12-18
72:22 - 72:23	R, 403, E, H		206:6-9 R, ID
73:7 - 73:9	R, 403, E, V, ID		206:12-16 R, ID
73:11 - 73:22	BE, D, R, 403, E, V, H		206:18-22 R, ID
73:24 - 74:12	BE, D, R, 403, E, V, FN, S, H		207:15-17 R, N, NA
74:15 - 74:19	BE, D, R, 403, E, V, FN, S		207:20-208:2 R, N, NA
74:22 - 75:7	BE, D, R, 403, E, V, MIS, FN, S		208:4 R, N
75:10 - 75:17	BE, D, R, 403, E		210:18-19
76:11 - 76:22	BE, D, R, 403, E, V, ID		210:21
76:24 - 77:5	BE, D, R, 403, E, AF, V, FN, S		215:19-21 R
77:8 - 77:13	BE, D, R, 403, E, AF, V, FN, S		215:23-24 R
77:16 - 77:22	BE, D, R, 403, E, FN, S		220:2-6 R, N, NA
78:25 - 80:3	BE, D, R, 403, E, V		220:8-16 R, N, NA
88:7 - 88:13	BE, D, R, 403, E, AF, V, FN, S		221:4-7 R, N, NA
88:15 - 88:18	BE, D, R, 403, E, AF, V, FN, S		221:10-222:5 R, N, NA
88:20 - 88:20	BE, D, R, 403, FN, S		222:8-11 R
90:8 - 90:11	R, 403, E, AF, V, MIS, FN, S, IO		230:13 R
90:13 - 90:21	BE, D, R, 403, E, FN, S, H, IO		230:15 R

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
91:3 - 91:4	R, 403, E, V, FN, S, LC		232:8-13 ID, R, L
91:7 - 91:9	R, 403, E, MIS, FN, S, LC		232:15-22 ID, R, L, MIS
91:11 - 91:11	R, 403, E, FN, S, LC		232:24-233:8 MIS, R, L
91:12 - 91:15	R, 403, E, AF, V, MIS, FN, S, LC		233:10-12 MIS, R, CD, L
91:18 - 91:20	BE, R, 403, E, FN, S, LC		233:14 R
93:24 - 93:25	R, 403, E, V, FN, S		233:19-21 R, CD, N
94:2 - 94:11	R, 403, E, V, FN, S		233:23-234:8 R, CD, N
94:13 - 94:15	R, 403, E, V, FN, S		234:10 R, L
94:17 - 94:25	R, 403, E, V, FN, S		235:8-11 R, L
95:5 - 95:23	BE, D, R, 403, E		235:13-17 R, L
97:10 - 97:18	BE, D, R, 403, E, FN, S, IO, LC		235:19 R, L
97:20 - 98:1	BE, D, R, 403, E, FN, S, IO, LC		236:7-9 R, L
98:4 - 98:15	BE, D, R, 403, E, FN, S, IO, LC		236:11-13 R, L
98:17 - 98:24	BE, D, R, 403, E, AF, V, FN, S, IO, LC		236:15-25 R, L, ID
99:2 - 99:14	BE, R, 403, E, FN, S, IO		237:2-7 R, L, ID
103:3 - 103:5	BE, D, R, 403, E, FN		
103:7 - 103:8	BE, D, R, 403, E, FN		
103:9 - 103:14	BE, D, R, 403, E, FN, S, IO		
103:17 - 103:17	BE, D, R, 403, E, FN, S, IO		
104:1 - 105:7	BE, D, R, 403, E, AF, FN, S, IO, LC		
105:9 - 105:14	BE, D, R, 403, E, AF, MIS, FN, S, IO, LC		
105:17 - 105:23	BE, D, R, 403, E, AF, FN, S, IO, LC		
106:1 - 106:17	BE, D, R, 403, E, AF, MIS, FN, S, IO, LC		
106:19 - 107:4	BE, D, R, 403, E, AF, MIS, FN, S, IO, LC		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
107:7 - 107:7	BE, D, R, 403, FN, S, IO, LC		
107:18 - 107:20	BE, D, R, 403, E, AF, MIS, FN, S, IO, LC		
107:23 - 108:6	BE, D, R, 403, FN, S, IO, LC		
108:17 - 108:22	BE, D, R, 403, E, AF, MIS, FN, S, IO, LC		
108:24 - 109:6	BE, D, R, 403, FN, S, IO, LC		
109:17 - 109:21	BE, D, R, 403, E, AF, MIS, FN, S, IO, LC		
109:23 - 109:25	BE, D, R, 403, E, FN, S, IO, LC		
110:2 - 110:7	BE, D, R, 403, FN, S, IO, LC		
112:6 - 112:24	BE, D, R, 403, E, FN, S, IO, LC		
113:1 - 113:14	BE, D, R, 403, E, AF, V, FN, S, IO, LC		
113:16 - 114:3	BE, D, R, 403, E, V, MIS, FN, S, IO, LC		
114:4 - 114:11	BE, D, R, 403, E, V, FN, S, IO, LC, ATTY		
114:13 - 114:14	BE, R, 403, FN, S, IO, LC		
115:2 - 115:5	BE, R, 403, E, V, FN, S, IO, LC		
115:7 - 115:10	BE, R, 403, E, AF, V, FN, S, IO, LC, Priv		
115:21 - 116:1	BE, R, 403, E, AF, V, FN, S, IO, LC, Priv		
116:3 - 116:3	BE, R, 403, FN, S, IO, LC		
116:4 - 116:5	BE, R, 403, E, AF, V, MIS, FN, S, IO, LC		
116:7 - 116:7	BE, R, 403, FN, S, IO, LC		
117:22 - 118:4	BE, D, R, 403, E, FN, S, IO, LC		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
118:6 - 118:14	BE, D, R, 403, E, FN, S, IO, LC		
118:17 - 118:25	BE, D, R, 403, E, MIS, FN, S, IO, LC		
119:2 - 119:8	BE, D, R, 403, E, FN, S, IO, LC		
119:10 - 119:15	BE, D, R, 403, E, FN, S, IO, LC		
119:17 - 120:5	BE, D, R, 403, E, FN, S, IO, LC		
120:9 - 120:18	BE, D, R, 403, E, AF, V, FN, IH, S, IO, LC		
120:23 - 121:7	BE, D, R, 403, E, AF, V, FN, IH, S, IO, LC		
121:11 - 121:24	BE, D, R, 403, FN, IH, S, IO, LC		
123:10 - 123:13	BE, D, R, 403, E, AF, V, MIS, FN, IH, S, IO, LC		
123:16 - 123:21	BE, D, R, 403, E, AF, V, FN, S, IO, LC		
123:25 - 124:3	BE, D, R, 403, E, V, FN, S, IO, LC		
124:5 - 124:8	R, 403, E, AF, V, FN, S, IO, LC		
124:11 - 124:11	R, 403, FN, S, IO, LC		
127:10 - 127:23	BE, D, R, 403, E, V, FN, S, IO, LC		
128:2 - 128:8	R, 403, E, V, MIS, FN, S, IO, LC		
128:12 - 128:21	R, 403, E, AF, V, MIS, FN, S, IO, LC		
129:1 - 129:7	R, 403, E, V, MIS, FN, S, IO, LC		
129:11 - 129:21	R, 403, E, V, MIS, FN, S, IO, LC		
129:23 - 129:23	R, 403, FN, S, IO, LC		
133:24 - 134:2	R, 403, E, FN, S, IO, LC		
134:5 - 134:14	R, 403, E, AF, V, FN, CD, S, IO, LC		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
134:17 - 135:3	R, 403, E, AF, V, MIS, FN, CD, S, IO, LC		
135:7 - 135:13	R, 403, E, AF, V, FN, CD, S, IO, LC		
135:17 - 135:21	R, 403, FN, S, IO, LC		
136:23 - 136:24	R, 403, E, V, FN, S, IO, LC		
137:1 - 137:1	R, 403, FN, S, IO, LC		
137:2 - 137:7	R, 403, E, AF, V, MIS, FN, S, IO, LC		
137:11 - 137:12	R, 403, FN, S, IO, LC		
137:13 - 137:18	R, 403, E, AF, V, MIS, FN, S, IO, LC		
137:22 - 137:23	R, 403, FN, S, IO, LC		
138:16 - 138:19	R, 403, E, V, FN, S, IO, LC		
138:22 - 139:2	R, 403, E, V, FN, S, IO, LC		
139:5 - 139:6	R, 403, FN, S, IO, LC		
139:24 - 140:1	R, 403, E, V, FN, S, IO, LC		
140:4 - 140:11	R, 403, FN, S, IO, LC		
141:25 - 142:16	BE, D, R, 403, FN, S		
142:24 - 143:9	BE, D, R, 403, FN, S		
143:11 - 143:14	BE, D, R, 403, FN, S, IO, LC		
143:16 - 143:22	BE, D, R, 403, FN, S, IO, LC		
143:24 - 144:3	BE, D, R, 403, FN, S, IO, LC, ID		
144:11 - 144:16	BE, D, R, 403, FN, S, IO, LC, ID		
144:19 - 144:21	BE, D, R, 403, FN, S, IO, LC		
144:24 - 146:10	BE, D, R, 403, FN, S, IO, LC		
146:13 - 146:17	BE, D, R, 403, FN, S, IO, LC		
146:20 - 147:2	BE, D, R, 403, FN, S, IO, LC		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
147:5 - 147:8	BE, D, R, 403, E, V, FN, S, IO, LC		
147:11 - 147:17	BE, D, R, 403, E, V, MIS, FN, S, IO, LC		
147:19 - 148:1	BE, D, R, 403, E, V, MIS, FN, S, IO, LC		
148:4 - 148:7	BE, D, R, 403, E, V, MIS, FN, S, IO, LC		
148:10 - 148:15	BE, D, R, 403, E, V, MIS, FN, S, IO, LC, ID		
148:20 - 148:23	BE, D, R, 403, E, V, MIS, FN, S, IO, LC, ID		
149:2 - 149:7	BE, D, R, 403, E, V, MIS, FN, S, IO, LC		
149:9 - 149:15	BE, D, R, 403, FN, S, IO, LC		
149:23 - 150:1	BE, D, R, 403, E, V, MIS, FN, S, IO, LC, Arg		
150:4 - 150:10	BE, D, R, 403, FN, S, IO, LC		
150:13 - 150:13	BE, D, R, 403, FN, S, IO, LC		
150:14 - 151:2	BE, D, R, 403, FN, S, IO		
151:16 - 152:1	BE, D, R, 403, E, AF, V, FN, S, IO		
152:4 - 152:14	R, 403, E, AF, V, FN, S, IO		
152:17 - 152:23	R, 403, FN, S, IO		
157:23 - 157:25	R, 403, E, AF, MIS, FN, S, IO		
158:2 - 158:5	R, 403, E, AF, MIS, FN, S, IO		
158:7 - 158:13	R, 403, FN, S, H, IO		
159:7 - 159:8	BE, D, R, 403, E, AF, V, FN, S, IO		
159:10 - 159:16	BE, D, R, 403, E, AF, V, FN, S, IO		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
159:20 - 159:21	BE, D, R, 403, E, AF, V, FN, S, IO		
162:6 - 162:15	BE, D, R, 403, E, AF, V, FN, S, IO, LC		
162:19 - 163:2	BE, D, R, 403, E, AF, V, FN, IH, S, IO, LC		
163:6 - 163:21	BE, D, R, 403, FN, IH, S, IO, LC		
163:25 - 164:11	BE, D, R, 403, E, AF, V, FN, IH, S, IO, LC		
164:18 - 165:6	BE, D, R, 403, E, AF, V, FN, IH, S, IO, LC		
165:12 - 165:19	BE, D, R, 403, E, AF, V, MIS, FN, IH, S, IO, LC		
165:23 - 167:4	BE, D, R, 403, E, AF, V, FN, CD, IH, S, IO, LC		
167:8 - 167:16	BE, D, R, 403, E, AF, V, MIS, FN, IH, S, IO, LC		
167:20 - 167:20	BE, D, R, 403, E, AF, V, FN, IH, S, IO, LC		
167:21 - 168:9	BE, D, R, 403, E, AF, V, MIS, FN, IH, S, IO, LC		
168:12 - 168:12	BE, D, R, 403, E, AF, V, MIS, FN, CD, IH, S, IO, LC		
174:15 - 175:1	BE, D, R, 403, FN, IH, S, IO, LC		
177:2 - 177:6	BE, D, R, 403, FN		
177:9 - 177:17	BE, D, R, 403, FN		
177:20 - 178:3	BE, D, R, 403, FN, ID		
178:6 - 179:3	R, 403, E, AF, V, FN, IH, S, IO		
179:5 - 179:12	R, 403, E, AF, V, MIS, FN, IH, S, H, IO		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
179:15 - 179:15	R, 403, E, AF, V, MIS, FN, CD, IH, S, H, IO		
181:17 - 182:19	BE, D, R, 403, E, FN, S, IO		
182:22 - 184:10	BE, D, R, 403, E, FN, S, IO		
184:12 - 184:19	BE, D, R, 403, E, FN, S, IO		
184:21 - 184:24	BE, D, R, 403, E, FN, S		
185:1 - 185:4	BE, D, R, 403, E, FN, S		
185:7 - 185:7	BE, D, R, 403, E, FN, S		
185:24 - 185:25	BE, D, R, 403, E, FN, S		
186:3 - 186:7	BE, D, R, 403, E, FN, S		
187:2 - 187:4	BE, D, R, 403, E, FN, S		
187:7 - 187:17	R, 403, E, FN		
187:20 - 188:10	R, 403, E, FN, S		
188:13 - 188:17	BE, D, R, 403, E, AF, V, FN, CD, S		
188:20 - 188:22	BE, D, R, 403, E, FN, S		
188:24 - 189:6	BE, D, R, 403, E, AF, V, MIS, FN, CD, S, IO		
189:9 - 190:18	BE, D, R, 403, E, AF, V, MIS, FN, S, IO,		
190:21 - 190:24	BE, D, R, 403, E, AF, V, MIS, FN, S, IO		
192:10 - 192:22	BE, D, R, 403, E, AF, V, MIS, FN, IH, S, IO		
192:24 - 193:8	BE, D, R, 403, E, AF, V, FN, IH, S, IO		
193:11 - 193:21	BE, D, R, 403, FN, S, IO		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
193:23 - 194:3	BE, D, R, 403, E, AF, FN, S, IO		
194:5 - 194:10	BE, D, R, 403, E, V, FN, S, IO		
194:14 - 194:17	BE, D, R, 403, E, MIS, FN, S, IO		
195:3 - 195:21	BE, D, R, 403, E, MIS, FN, S, IO		
195:24 - 195:24	R, 403, E, AF, V, MIS, FN, CD, S, IO		
196:5 - 196:14	R, 403, FN, S, IO		
196:17 - 197:9	BE, D, R, 403, E, AF, FN, S		
197:11 - 197:14	BE, D, R, 403, FN, S		
197:17 - 197:19	BE, D, R, 403, FN, S		
197:20 - 198:8	BE, D, R, 403, E, FN, S		
198:10 - 198:10	BE, R, 403, E, AF, V, FN, S		
199:23 - 200:20	R, 403, FN, S, IO		
200:23 - 201:2	BE, D, R, 403, FN, S		
202:3 - 202:7	BE, D, R, 403, FN, S		
202:10 - 202:12	BE, D, R, 403, FN, S		
202:13 - 202:15	BE, D, R, 403, MIS, FN, S, ID		
202:17 - 202:22	BE, D, R, 403, E, AF, MIS, FN, S, IO		
202:25 - 202:25	BE, D, R, 403, FN, S, IO		
203:19 - 203:22	R, 403, E, AF, V, MIS, FN, S, IO		
203:25 - 204:25	R, 403, E, AF, V, FN, S, IO		
205:1 - 205:9	R, 403, FN, S, IO		
207:8 - 207:10	R, 403, E, AF, MIS, FN, S, IO		
207:13 - 207:14	BE, D, R, 403, FN, S, H		
209:15 - 209:18	R, 403, E, AF, V, FN, S		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
209:21 - 210:1	BE, R, 403, E, AF, V, MIS, FN, S		
210:4 - 210:5	BE, R, 403, FN, S		
210:7 - 210:7	R, 403, E, AF, V, MIS, FN, S, H, IO		
210:8 - 210:17	R, 403, E, AF, V, MIS, FN, S, H, IO		
210:22 - 211:14	R, 403, E, MIS, FN, S, H, IO		
211:16 - 212:5	R, 403, FN, S, H, IO		
212:7 - 212:20	R, 403, E, AF, V, MIS, FN, CD, S, H, IO		
212:22 - 213:11	BE, D, R, 403, E, AF, MIS, FN, S		
213:14 - 213:18	BE, D, R, 403, E, AF, MIS, FN, S		
213:21 - 214:12	BE, D, R, 403, E, AF, FN, S		
214:14 - 214:25	BE, D, R, 403, E, AF, MIS, FN, S		
215:2 - 215:18	BE, D, R, 403, E, AF, MIS, FN, S		
215:25 - 217:6	BE, D, R, 403, FN, S		
217:9 - 217:13	BE, D, R, 403, E, MIS, FN, S		
217:15 - 218:3	BE, D, R, 403, FN, S, IO		
219:13 - 219:15	BE, D, R, 403, E, AF, MIS, FN, S		
219:17 - 220:1	BE, D, R, 403, E, AF, V, FN, S		
220:17 - 220:20	BE, D, R, 403, FN, S		
220:22 - 221:1	BE, D, R, 403, E, AF, MIS, FN, S, IO		
221:3 - 221:3	BE, D, R, 403, FN, S, IO		
227:8 - 228:9	BE, D, R, 403, E, AF, V, MIS, FN, S, IO		
228:13 - 228:25	BE, D, R, 403, E, AF, MIS, FN, S, IO		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
229:3 - 229:11	BE, D, R, 403, FN, S, IO		
229:18 - 230:12	BE, D, R, 403, E, AF, V, MIS, FN, S		
156:6-11	BE, D, R, 403, E, AF, V, FN, S		
156:14-22	BE, D, R, 403, E, AF, V, FN, S		
156:25-157:6	BE, D, R, 403, FN, S, IO		

EXHIBIT 9**VII. Mariana Faria-Urbina (October 11, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
8:16 - 8:18		11:20-24	11:20-24	403, R
29:13 - 29:23	D, R, Scope	12:1	12:1	403, R
30:3 - 30:6	ID, R, V, Scope	12:3-4	12:3-4	403, R
31:3 - 31:11	ID, R, V, Scope	12:6	12:6	403, R
31:18 - 31:25	ID, R, V, Scope	12:8-9	12:8-9	
33:22 - 34:9	D, ID, R, V, Scope	12:11	12:11	
	AF, ID, R, V, 403, IO, E, Scope	25:24-26:1	25:24-26:1	R
35:19 - 35:21	AF, ID, R, V, 403, IO, E, Scope	26:3-27:6	26:3-27:6	R
35:23 - 35:25	AF, ID, R, V, 403, IO, E, Scope	27:8	27:8	R
36:18 - 36:20	AF, ID, FN, R, V, 403, IO, E, Scope	30:9-31:2	30:9-31:2	R
38:3 - 38:5	ID, R, V, IO, Scope	32:5-33:21	32:5-33:21	R
38:7 - 38:7	ID, R, V, IO, Scope	34:10-11	34:10-11	R
39:1 - 39:5	ID, R, V, IO, Scope	36:2-4	36:2-4	R
41:15 - 41:18	ID, R, V, Scope	36:6	36:6	R
46:15 - 46:20	D, R	37:14-17	37:14-17	403
46:23 - 46:25	D, R	37:19-38:2	37:19-38:2	403, R (37:19- 38:2)
	ID, R, V	38:9-13	38:9-13	
47:13 - 47:15		38:15-18	38:15-18	
47:17 - 47:18	ID, R, V	38:20-25	38:20-25	R
47:20 - 48:4	ID, R, V	39:11-12	39:11-12	R
50:10 - 50:15	ID, R	39:14-23	39:14-23	R
	403, CD, FN, ID, MIS, R, V, Scope	39:25-40:5	39:25-40:5	R
54:19 - 54:23		40:7	40:7	R
55:22 - 55:23	403, E, FN, ID, R, S, V, Scope	40:15-18	40:15-18	R
55:25 - 55:25	403, E, FN, ID, R, S, V, Scope	40:20	40:20	R
	403, E, FN, ID, R, S, V, Scope	41:19-42:17	41:19-42:17	R
56:2 - 56:4		43:4-11	43:4-11	
56:8 - 56:9	403, E, FN, ID, R, S, V, Scope	43:13-19	43:13-19	
56:12 - 56:13	403, E, ID, R, V, Scope	43:21-25	43:21-25	
57:11 - 57:12	403, E, ID, R, V, Scope	44:2-45:3	44:2-45:3	
57:14 - 57:14	403, E, ID, R, V, Scope	45:8-9	45:8-9	
		45:11-15	45:11-15	
		45:17	45:17	
		48:5-49:7	48:5-49:7	
		49:9-13	49:9-13	
		49:17-21	49:17-21	
		49:23-25	49:23-25	
		50:2	50:2	
		50:4-6	50:4-6	
			43:4-11	R

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
57:16 - 57:17	403, E, ID, R, V, Scope	50:8 50:22-24	43:13-19	R
57:18 - 57:21	403, E, ID, R, V, Scope	51:1-21 51:23-52:4	43:21-25	R
57:23 - 58:3	403, E, ID, R, V, Scope	52:6-13 52:15-21	44:2-45:3	R
58:5 - 58:7	403, E, ID, R, V, Scope	52:23-53:2 56:15	45:8-9	R
58:9 - 58:11	403, E, ID, R, V, Scope	56:17-19 57:1	45:11-15	R
59:24 - 59:25	403, R, V, Scope	57:3-6	45:17	R
60:2 - 60:13	403, R, V, Scope	57:8-9	48:5-49:7	R
63:10 - 63:13	403, ID, R, V, Scope	58:23-59:3	49:9-13	R
63:15 - 63:15	403, ID, R, V, Scope	59:5-19	49:17-21	ATTY, R
65:14 - 65:17	ID, R, V, Scope	59:21-22	49:23-25	ATTY, R
65:20 - 66:3	D, ID, R, V, Scope	61:1	50:2	R
66:4 - 66:6	D, ID, R, V, Scope	61:3-7	50:4-6	R
66:13 - 66:14	ID, R, V, Scope	61:9-11	50:8	R
68:14 - 68:16	ID, R, V, Scope	61:13-16	50:22-24	R
79:3 - 79:18	D	61:18-21	51:1-21	R
81:22 - 82:10	403, D, FN, S, ID, R, V	61:23-62:2 62:4-8	51:23-52:4	R
83:17 - 83:25	403, ID, R, V	62:10-14 62:16-23	52:6-13	R
84:1 - 84:3	403, AF, BE, CD, D, FN, ID, R, S, V, IO, Scope	62:25-63:4 63:6-9	52:15-21	R
84:5 - 84:10	403, AF, BE, CD, D, FN, ID, R, S, V, Scope	64:22-65:3 66:7-9 66:15-22 66:24	52:23-53:2	R
84:12 - 84:12	403, AF, BE, CD, D, FN, ID, R, S, V	68:3-7 68:9-13	56:15	ID, R
84:14 - 84:15	403, AF, FN, ID, R, S, V	68:17-18 68:20-25	56:17-19	ID, R
84:17 - 84:17	403, AF, FN, ID, R, S, V	69:2 73:16-74:3	57:1	R
84:19 - 84:20	D, R, V	74:5-7	57:3-6	R
87:5 - 87:8	403, MIS, R, V	74:19-25	57:8-9	R
87:10 - 87:10	403, MIS, R, V	75:2-10	58:23-59:3	R
91:18 - 92:21	403, AF, BE, CD, D, FN, ID, MIS, R, S, V, IO	75:12-76:13 76:15-21	59:5-19	R

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
92:23 - 93:2	403, D, ID, MIS, R, V, IO	76:23-24 81:4-7	59:21-22	R
93:4 - 93:4	403, D, ID, MIS, R, V, IO	82:20-21 82:23	61:1	R
93:6 - 93:8	403, D, ID, MIS, R, V, IO	82:25-83:2 83:10-11	61:3-7	R
93:10 - 93:10	403, D, ID, MIS, R, V, IO	83:13-15 84:21-22	61:9-11	R
93:12 - 93:15	403, AF, FN, R, S, V	84:24-85:1	61:13-16	R
94:8 - 94:10	D, R	85:3-6	61:18-21	R
94:14 - 94:19	403, BE, D, FN, ID, R, V, IO, E	85:8-12 85:14-18	61:23-62:2	R
94:21 - 95:2	403, BE, D, FN, ID, R, V, IO, E	85:20-23 86:18-21	62:4-8	R
95:4 - 95:10	403, D, ID, R, V, IO, E	86:23-87:8 87:10	62:10-14	R
95:12 - 95:12	403, D, ID, R, V, IO, E	88:9-10 88:12	62:16-23	R
95:14 - 95:14	403, ID, R, V, IO, E	88:14-16	62:25-63:4	R
95:16 - 95:18	403, ID, R, V, IO, E	88:23-25	63:6-9	R
95:20 - 95:21	403, FN, IO, IH, LC, S, V, IO, E	89:2-4 90:3-10	64:22-65:3	R
95:23 - 95:24	403, FN, IO, IH, LC, S, V, IO, E	90:12-22 90:23-91:7	66:7-9	R
96:1 - 96:12	403, D, FN, ID, R, IO, E	91:9 93:16-23	66:15-22	R
96:13 - 96:14	403, AF, D, FN, ID, IO, R, S, V, IO, E	93:25 94:2-4 94:6	66:24	R
96:16 - 97:1	403, AF, D, FN, ID, IO, L, R, S, V, IO, E	100:5-8 101:17-102:3	68:3-7	R
97:3 - 97:3	403, AF, D, FN, ID, IO, L, R, S, V, IO, E	102:5 102:23-103:2	68:9-13	R
97:5 - 97:8	403, Arg, AF, BE, D, FN, ID, R, S, V, IO, E	103:4 103:6-8 103:12-13	68:17-18	R
97:10 - 97:12	403, Arg, AF, D, FN, ID, R, S, V, IO, E	103:15 103:17-18	68:20-25	R
97:14 - 97:16	403, Arg, AF, D, FN, ID, R, S, V, IO, E	103:20 109:9-13	69:2	403, R
97:17 - 97:21	403, Arg, AF, D, FN, ID, R, S, V, IO, E	109:20-22	73:16-74:3	R

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
97:24 - 98:12	403, Arg, AF, D, FN, ID, R, S, V, IO, E	109:24-110:1 110:3	74:5-7 R
98:13 - 98:17	403, Arg, AF, BE, D, E, FN, ID, L, R, V, IO, E	110:11-13 110:21-23 110:25-111:4	74:19-25 R
98:19 - 98:21	403, Arg, AF, BE, D, E, FN, L, R, V, IO, E	111:6-7 111:9	75:2-10 R
98:22 - 98:22	403, Arg, AF, BE, D, E, FN, L, R, V, IO, E	111:21-24 112:23-25	75:12-76:13 R
98:24 - 99:2	403, Arg, AF, BE, D, E, FN, ID, L, R, V, IO, E	113:2-3 113:19-22 114:6-25	76:15-21 R
99:4 - 99:8	403, Arg, AF, D, FN, IO, R, V, IO, E	115:2-3 115:10-116:6	76:23-24 R
99:10 - 99:15	403, Arg, AF, D, FN, IO, R, V, IO, E	124:18-19 127:23-25	81:4-7 R
99:17 - 99:21	403, Arg, D, FN, ID, R, V, IO, E	128:2 128:4-15	82:20-21 R
99:23 - 99:23	403, Arg, D, FN, ID, R, V, IO, E	128:17-22 131:13-15	82:23 R
102:7 - 102:13	403, AF, BE, D, FN, ID, L, V, IO, E	131:17-132:2 132:4	82:25-83:2 R
102:15 - 102:19	403, AF, BE, D, FN, ID, L, V, IO, E	140:4-5 140:7	83:10-11 R
102:21 - 102:21	403, AF, BE, D, FN, ID, L, V, IO, E	140:14-15 140:17	83:13-15 R
103:22 - 104:8	403, D, FN, IO, E, S	140:19-21	84:21-22 R
104:10 - 104:18	403, D, FN, IO, E, S	140:23-24	84:24-85:1 R
104:20 - 104:23	403, D, FN, IO, E, S	141:22-142:2	85:3-6 R
105:1 - 105:2	403, D, FN, IO, E, S, ID	142:16-25 143:2-7	85:8-12 R
108:20 - 109:8	403, Arg, CD, FN, ID, R, V, IO, E, Scope	143:24-144:4 144:6-15 144:17	85:14-18 R
109:14 - 109:16	403, FN, R, S, V	144:19-25	85:20-23 R
109:18 - 109:18	403, FN, R, S, V	145:9-12	86:18-21 R
110:5 - 110:8	403, Arg, AF, FN, MIS, R, S, V	145:14-23 145:25-146:1	86:23-87:8 R (86:23-87:4)
112:3 - 112:11	403, BE, D, L, R, V	146:3-5	87:10 R
112:16 - 112:22	403, D, L, R, V	148:5-9	88:9-10 R

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
115:5 - 115:6	403, Arg, AF, BE, D, FN, ID, IO, L, MIS, S, V, E, Scope	148:11-149:4 151:4-8 151:10-12 152:24-153:1 153:3-14 156:9-18 157:8-10 162:1-3 162:5-9 162:11-17 162:19-163:2 163:4-9 163:11 166:12-14	88:12 R
115:8 - 115:8	403, Arg, AF, BE, D, FN, ID, IO, L, MIS, S, V, E, Scope		88:14-16 R
116:7 - 116:11	403, Arg, AF, BE, D, FN, ID, L, S		88:23-25 R
116:13 - 116:14	403, Arg, AF, BE, D, FN, ID, L, S		89:2-4 R
116:16 - 116:19	403, Arg, AF, BE, D, FN, ID, L, S, V		90:3-10 R
116:21 - 116:21	403, Arg, AF, BE, D, FN, ID, L, S, V		90:12-22 R
116:23 - 117:7	403, AF, BE, D, FN, ID, S, IO, E		90:23-91:7 R
117:9 - 117:9	403, AF, BE, D, FN, ID, S, IO, E		91:9 R
117:23 - 118:1	403, Arg, IO, E		93:16-23 R
118:4 - 118:7	403, Arg, FN, IO, S, V, E, Scope		93:25 R
118:9 - 118:15	403, Arg, D, FN, IO, S, V, E, Scope		94:2-4 R
118:17 - 119:1	403, Arg, D, FN, S, V, IO, E, Scope		94:6 R
119:3 - 119:8	403, Arg, D, FN, S, V, IO, E, Scope		100:5-8
119:9 - 119:18	403, Arg, D, FN, S, V, E, Scope		101:17-102:3
119:20 - 119:25	403, Arg, D, FN, S, V, E, Scope		102:5
120:2 - 120:4	403, Arg, D, FN, S, V, E, Scope		102:23-103:2 R
120:18 - 120:21	403, Arg, AF, BE, D, E, FN, MIS, S, V		103:4 R
120:23 - 120:24	403, Arg, AF, BE, D, E, FN, MIS, S, V		103:6-8 R
121:1 - 121:8	403, Arg, AF, BE, D, FN, ID, IO, MIS, S, V		103:12-13

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
121:10 - 121:16	403, Arg, AF, FN, ID, IO, S, V		103:15
122:24 - 124:3	403, Arg, AF, BE, D, FN, ID, IO, L, MIS, S, V		103:17-18
124:5 - 124:5	403, Arg, AF, BE, D, FN, ID, IO, L, MIS, S, V, E		103:20
124:7 - 124:7	403, Arg, AF, BE, D, FN, ID, IO, L, MIS, S, V, E		109:9-13 R
124:9 - 124:9	403, Arg, AF, BE, D, FN, ID, IO, L, MIS, S, V, E		109:20-22 R
125:6 - 125:12	403, Arg, AF, BE, D, FN, S, V		109:24-110:1 R
125:14 - 125:15	403, Arg, AF, BE, D, FN, S, V		110:3 R
127:4 - 127:16	403, D, FN, ID, IO, R, S, V		110:11-13 R
127:20 - 127:21	403, Arg, ID, FN, IO, MIS, R, S, V		110:21-23
128:24 - 129:7	403, D, FN, ID, IO, MIS, R, V, E		110:25-111:4 N
129:9 - 129:10	403, D, FN, ID, IO, MIS, R, V, E		111:6-7
130:12 - 130:14	403, BE, D, FN, ID, IO, MIS, R, V, E, AF, S, H		111:9 403, R
130:16 - 130:21	403, BE, D, FN, ID, IO, MIS, R, V, E, AF, S, H		111:21-24
130:24 - 131:1	403, Arg, BE, D, FN, ID, IO, MIS, R, V		112:23-25
131:3 - 131:7	403, Arg, BE, D, FN, ID, IO, MIS, R, V		113:2-3 N, R
131:9 - 131:11	403, Arg, BE, D, FN, ID, IO, MIS, R, V		113:19-22
132:6 – 132:7	403, Arg, BE, D, FN, ID, MIS, R, V, E		114:6-25 R (114:23-25)

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
132:9 – 132:15	403, Arg, BE, D, FN, ID, MIS, R, V, E		115:2-3 R
132:17 – 132:17	403, Arg, BE, D, FN, ID, MIS, R, V, E		115:10-116:6 R
141:1 - 141:21	403, Arg, D, ID, R, V, E		124:18-19
149:6 - 149:10	403, Arg, AF, BE, D, FN, ID, IO, MIS, R, S, V		127:23-25 R
149:12 - 149:12	403, Arg, AF, BE, D, FN, ID, IO, MIS, R, S, V		128:2 R
149:14 - 149:17	403, Arg, AF, BE, D, FN, ID, IO, MIS, R, S, V		128:4-15
149:20 - 149:21	403, Arg, AF, D, FN, ID, R, V		128:17-22
149:23 - 149:23	403, Arg, AF, D, FN, ID, R, V		131:13-15 403, R
149:25 - 150:3	403, Arg, AA, AF, BE, D, E, FN, ID, IO, L, MIS, R, S, V		131:17-132:2 403, R
150:5 - 150:6	403, Arg, AA, AF, BE, D, E, FN, ID, IO, L, MIS, R, S, V		132:4 403, R
150:8 - 150:12	403, Arg, E, ID, MIS, R, S, V		140:4-5 ID, R
150:14 - 150:14	403, Arg, E, ID, MIS, R, S, V		140:7 ID, R
150:16 - 150:19	403, ID, R, S, V, Scope		140:14-15 ID, R
151:2 - 151:3	403, ID, R, S, V, Scope		140:17 ID, R
152:3 - 152:13	403, FN, ID, IO, S, V, Scope		140:19-21 ID, R
153:16 - 153:20	403, Arg, AF, BE, CD, E, FN, ID, IO, MIS, S, V, Scope		140:23-24 ID, R
153:22 - 153:24	403, Arg, AF, BE, CD, E, FN, ID, IO, MIS, S, V, Scope		141:22-142:2 R

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
154:1 - 154:3	403, Arg, AF, BE, CD, E, FN, ID, IO, MIS, S, V, Scope		142:16-25 ID, R
154:5 - 154:6	403, Arg, AF, BE, CD, E, FN, ID, IO, MIS, S, V, Scope		143:2-7 ID, R
154:8 - 154:9	403, FN, ID, R, V, S, Scope		143:24-144:4 ID, R
154:13 - 154:20	403, R, V, H, V, Scope		144:6-15 ID, R
154:22 - 154:24	403, R, V, H, V, Scope		144:17 ID, R
155:1 - 155:8	403, R, V, H, V, Scope		144:19-25 ID, R
156:25 - 157:3	403, R, V, H, V, Scope		145:9-12 ID, R
157:24 - 158:6	403, Arg, AF, BE, D, E, FN, ID, IO, MIS, S, V		145:14-23 ID, R
158:8 - 158:12	403, Arg, AF, BE, D, E, FN, ID, IO, MIS, S, V		145:25-146:1 ID, R
158:14 - 158:14	403, Arg, AF, BE, D, E, FN, ID, IO, MIS, S, V		146:3-5 ID, R
158:23 - 159:2	403, D, ID, V		148:5-9 R
159:5 - 159:7	403, Arg, AF, E, FN, ID, IO, MIS, S, V		148:11-149:4 R
159:9 - 159:10	403, Arg, AF, BE, E, FN, ID, IO, MIS, S, V		151:4-8 403, R
159:12 - 159:17	403, D, E, FN, ID, IO, S, V		151:10-12 403, R
159:19 - 159:22	403, D, E, FN, ID, IO, S, V		152:24-153:1 IO, R
161:1 - 161:4	403, Arg, AA, D, ID, MIS, V, E		153:3-14 IO, R
161:6 - 161:11	403, Arg, AA, D, ID, MIS, V, E		156:9-18
161:13 - 161:19	403, Arg, AA, D, ID, MIS, V, E		157:8-10 R

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
161:21 - 161:24	403, Arg, AA, D, ID, MIS, V, E		162:1-3 R
163:13 - 163:14	403, Arg, AA, D, FN, ID, IO, MIS, S, V, E, Scope		162:5-9 R
163:16 - 163:16	403, Arg, AA, D, FN, ID, IO, MIS, S, V, E, Scope		162:11-17 R
163:18 - 164:8	403, Arg, AA, BE, D, FN, ID, IO, L, MIS, S, V, E, Scope		162:19-163:2 R
164:10 - 164:18	403, Arg, AA, BE, D, FN, ID, IO, L, MIS, S, V, E, Scope		163:4-9 R
165:8 - 165:9	403, Arg, BE, D, E, FN, ID, MIS, S, V, IO, Scope		163:11 R
165:11 - 165:23	403, Arg, BE, D, E, FN, ID, MIS, S, V, IO, Scope		166:12-14 R

EXHIBIT 9**VIII. Kevin Laliberte (November 8, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
6:2 - 6:7		12:22-13:6	12:22-13:6
8:1 - 8:3		13:24-14:2	13:24-14:2
10:12 - 10:21	D, H	14:18-15:2	14:18-15:2
11:15 - 11:20	D, R	15:23-16:12	15:23-16:12
11:24 - 12:21	ID, R, V	19:11-17	19:11-17
13:9 - 13:23	AF, ID, L, MIS, R, V	20:14-18	20:14-18 R
14:9 - 14:17	ID, R, V	21:23-22:5	21:23-22:5
15:5 - 15:12	ID, L, MIS, R, V	23:15-24:12	23:15-24:12
15:13 - 15:22	ID, R, V	25:10-22	25:10-22 R
16:23 - 16:25	ID, R, V	26:11-27:4	26:11-27:4 R
17:7 - 17:14	ID, R, V	27:7-15	27:7-15 R
17:15 - 17:18	ID, R, V	28:14-29:1	28:14-29:1
17:21 - 17:25	ID, R, V	32:1-7	32:1-7
18:1 - 18:3	AF, ID, L, MIS, R, V	33:10-11	33:10-11
18:22 - 19:4	ID, R, V	42:16-25	42:16-25
19:5 - 19:7	ID, MIS, R, V	43:1-20	43:1-20 R
24:19 - 25:1	L, MIS, R, V	44:4-11	44:4-11
25:4 - 25:7	ID, V, R, S	44:15-22	44:15-22
	AA, V, 403, BE, FN, H, MIS, R, S	45:17-20	45:17-20
29:2 - 31:25		47:9-11	
		53:25-54:6	
32:10 - 32:12	403, BE, E, FN, IO, IH, LC, V	55:4-9	47:9-11
		55:16-56:2	
32:24 - 33:6	ATTY, 403, BE, ID, IO, L, LC, MIS, S, V	57:13-20	53:25-54:6 R
33:7 - 33:9	ID, R, V	58:3-59:18	
		60:15-21	55:4-9 ID, R
34:2 - 34:6	403, AF, H, MIS, R, V	61:21-62:5	55:16-56:2 ID, R
34:22 - 34:24	403, ID, R, V	63:9-12	57:13-20 ID, R
		66:13-18	58:3-59:18 ID, R
35:3 - 35:5	403, AF, H, MIS, R, V	74:19-25	
35:16 - 36:6	403, H, R, S, V	80:5-7	
36:21 - 37:6	403, R, V, LC, FN	80:16-81:3	60:15-21 R
37:9 - 37:22	403, MIS, R, V, FN	81:20-82:1	61:21-62:5 R
37:23 - 38:4	403, ID, R, V	82:3-14	63:9-12 ID, R
40:24 - 41:5	403, AF, MIS, R, V	82:18-83:11	66:13-18 R
		83:14-25	74:19-25 403, R
41:21 - 41:24	403, AF, E, R, V, S, ID	84:5-6	80:5-7
		84:18-85:3	
41:25 - 42:13	403, AF, MIS, R, V, S, ID	86:6-8	80:16-81:3
		86:10-20	

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
46:8 - 47:5	AA, 403, R, V, LC, S, FN	86:24-87:6 91:6-10 91:12-16 91:23-92:1 92:3-19 96:3-5 96:13-23 97:24-98:3 109:12-110:1 110:17-20 111:4-9 111:13-16 123:15-19	81:20-82:1
53:6 - 53:13	403, CD, MIS, R, V		82:3-14 R
56:10 - 57:8	403, BE, H, ID, V, MIS, S		82:18-83:11 R
71:2 - 71:8	D, H, ID, FN, AF, ATTY		83:14-25 R
71:20 - 71:25	BE, D, H, FN, AF		84:5-6 R
73:16 - 73:19	403, BE, D, H, FN, AF		84:18-85:3 R
73:24 - 74:18	403, AF, E, H, MIS, V, FN, S		86:6-8 R
88:11 - 88:22	403, AA, D, E, H, ID, S, V, FN		86:10-20 R
99:22 - 100:3	403, D, E, MIS, R, V, FN		86:24-87:6 R
108:12 - 109:7	BE, D, H, FN		91:6-10 R
111:19 - 111:23	403, ID, E, R, S, FN, V		91:12-16 R
117:15 - 120:25	403, BE, ID, D, H, R, S, V, FN		91:23-92:1 R
121:23 - 122:3	403, BE, MIL, D, H, IO		92:3-19 R
122:4 - 122:21	403, ID, BE, MIL, D, R, H, V		96:3-5 ID, R
123:4 - 123:14	403, ID, BE, S, V		96:13-23 ID, R
125:5 - 125:12	403, BE, S, V, R		97:24-98:3 ID, R
125:13 - 125:14	403, BE, S, V, R		109:12-110:1
127:17 - 128:15	D, H, 403, V, R, ID		110:17-20
			111:4-9
			111:13-16
			123:15-19 R

EXHIBIT 9**IX. Cynthia Leigh Peterson (November 6, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
6:16 - 6:20		10:10-16	10:10-16
6:21 - 7:1		34:2-8	R, NA
8:16 - 8:18		34:11-35:4	R, NA
9:23 - 10:7	BE, D, R, 403	39:17-40:4	39:17-40:4
15:9 - 16:18	BE, D, R, 403, E, V, FN, S	49:19-21 49:23-50:3	R R, N
16:17 - 16:18	BE, D, R, 403, E, AF, V, MIS, FN, S	54:23-55:7 65:13-15	R, N
16:20 - 17:20	BE, D, R, 403, E, AF, V, MIS, FN, S	65:17-66:3 67:12-17	54:23-55:7
17:22 - 20:3	BE, D, R, 403, E, AF, V, MIS, FN, S	72:22-73:1 73:3-9	65:13-15
20:5 - 20:8	BE, D, R, 403, E, AF, V, FN, S	73:11-74:3 77:1-6 77:9-10 86:4-87:17	65:17-66:3
20:10 - 22:15	BE, D, R, 403, E, AF, V, MIS, FN, S	90:1-6 99:21-100:2	67:12-17
22:17 - 23:19	BE, D, R, 403, E, AF, V, MIS, FN, S	100:6-11 101:16-19	72:22-73:1
23:21 - 26:25	BE, D, R, 403, E, AF, V, MIS, FN, S, IO	101:21-102:2 102:5-9 103:19-20 103:22-23	73:3-9 R, N, NA
33:8 - 33:11	BE, R, 403, E, MIS, FN, S, IO	104:6-7 104:9-13 106:18-20	73:11-74:3 R, N, NA
33:13 - 33:18	BE, R, 403, E, FN, S, IO	106:22-107:5 107:7-8 107:18-22	77:1-6 R, ID
33:20 - 33:25	BE, R, 403, FN, S, IO	107:24-108:7 123:19-22	77:9-10 R, ID
38:11 - 38:14	R, 403, E, AF, V, MIS, FN, S	123:24-124:6 124:8-9	86:4-87:17 R, N, NA
38:18 - 38:22	R, 403, E, AF, V, MIS, FN, S	124:11-13 124:15-19	90:1-6 R
38:25 - 39:3	R, 403, E, AF, V, MIS, FN, S	124:21-25 128:3-17	99:21-100:2 R
39:5 - 39:5	R, 403, FN, S		100:6-11 R
39:7 - 39:12	BE, R, 403, E, AF, V, FN, S, IO		101:16-19 R, N
39:15 - 39:15	BE, R, 403, FN, S, IO		101:21-102:2 R, N

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
42:9 - 44:3	R, 403, E, AF, V, MIS, FN, S, IO	128:24-129:19 131:13-16	102:5-9 R, N
45:5 - 45:6	BE, R, 403, E, V, FN, S	132:10-12 133:8-12	103:19-20 R, N
45:8 - 45:15	BE, R, 403, E, AF, V, MIS, FN, S	133:16-22 133:24-134:1	103:22-23 R, N
45:17 - 45:22	BE, R, 403, E, V, MIS, FN, S	134:3-9 134:11-15	104:6-7 R, N
45:24 - 45:24	BE, R, 403, FN, S	134:17-21	104:9-13 R, N
48:3 - 48:15	BE, D, R, 403, E, V, MIS, FN, S	134:23-25 137:8-11	106:18-20 R, N
48:17 - 48:17	BE, D, R, 403, FN, S	137:13-138:1	106:22-107:5 R, N
48:19 - 49:1	BE, R, 403, E, AF, V, MIS, FN, S, ATTY	138:5-10 138:12-23 139:3-9	107:7-8 R, N
49:2 - 49:2	BE, R, 403, FN, S	139:11-13	107:18-22 R, N
49:4 - 49:12	BE, R, 403, E, AF, V, MIS, FN, S	139:15-24 140:1-3	107:24-108:7 R, N
49:14 - 49:17	BE, R, 403, FN, S	140:5-15 143:17-19	123:19-22 R
51:22 - 51:24	R, 403, E, AF, V, MIS, FN, S	143:21-145:1	123:24-124:6 R
52:1 - 52:10	BE, R, 403, FN, S	146:8-11	124:8-9 R
52:23 - 55:7	D, R, 403, E, AF, V, MIS, FN, S	146:13-23 147:1-19	124:11-13 R
59:19 - 59:22	D, R, 403, E, AF, V, MIS, FN, S	148:2-3 148:17-20	124:15-19 R
59:24 - 60:4	R, 403, E, V, MIS, FN, S	148:24-149:4 149:6-7	124:21-25 R, N
60:7 - 60:19	R, 403, E, V, MIS, FN, S	150:15-20 150:22-25	128:3-17 R, N
60:21 - 60:23	R, 403, FN, S	151:2-13 151:25-152:3	128:24-129:19 R, N, NA
61:23 - 62:2	R, 403, E, AF, V, MIS, FN, S, AA	152:5-12	131:13-16 R, ID
62:4 - 62:5	R, 403, FN, S	152:14-18 152:20-24	132:10-12 R, ID
62:7 - 62:9	BE, R, 403, E, V, MIS, FN, S, AA	154:13-17 154:19-22	133:8-12 R, N
62:11 - 62:17	BE, R, 403, AF, V, MIS, FN, IH, S, H	162:13-18 162:20-163:5	133:16-22 R, N
66:13 - 66:16	R, 403, E, AF, V, FN, S	163:19-21	133:24-134:1 R

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
66:19 - 67:2	R, 403, FN, S, IO, MIS	163:25-165:6 165:8-17	134:3-9	R
67:4 - 67:7	R, 403, E, AF, V, MIS, FN, S, IO	165:19-25 166:2-3	134:11-15	R
67:10 - 67:10	R, 403, FN, S, IO	167:15-18	134:17-21	R
67:18 - 67:20	R, 403, E, AF, V, MIS, FN, S, IO	167:20-168:9 168:12	134:23-25	R
67:22 - 68:2	R, 403, E, FN, S, IO, AA	190:19-25 191:2-11	137:8-11	R
68:4 - 68:12	R, 403, E, AF, V, FN, S, IO, AA	191:13-23 191:25-192:1	137:13-138:1	R
68:14 - 71:9	R, 403, E, AF, V, MIS, FN, S, IO, AA	202:21-203:15 203:16-25	138:5-10	R
71:12 - 71:20	R, 403, E, AF, V, MIS, FN, S, IO, AA	205:2-14 205:25-207:9	138:12-23	R, N
71:22 - 72:13	D, R, 403, E, AF, V, MIS, FN, S, IO, AA, LC	207:19-22 207:24-208:6 208:19-20	139:3-9	R
82:14 - 82:18	R, 403	208:22-209:3	139:11-13	R
82:22 - 83:7	D, R, 403, E, V, FN, S, IO, LC, ID	226:1-5 226:7-15	139:15-24	R
83:9 - 83:11	D, R, 403, E, V, FN, S, IO, LC, ID	226:17-24 233:25-234:16	140:1-3	R
83:13 - 83:22	D, R, 403, E, AF, V, FN, S, IO, LC, ID	235:1-17 237:6-238:14	140:5-15	R
84:1 - 85:5	D, R, 403, E, AF, V, MIS, FN, S, IO, LC	238:16 238:23-239:14	143:17-19	R
85:9 - 86:3	R, 403, E, MIS, FN, S, IO, LC	241:8-10 241:12-25	143:21-145:1	R
88:9 - 88:12	BE, D, R, 403, FN, S, IO, LC		146:8-11	
88:25 - 89:1	BE, D, R, 403, E, V, FN, S, IO, LC		146:13-23	
89:5 - 89:13	BE, D, R, 403, E, AF, V, MIS, FN, S, IO, LC		147:1-19	N, NA
91:11 - 91:13	BE, D, R, 403, E, V, MIS, FN, S, IO		148:2-3	ID
91:15 - 91:20	BE, R, 403, E, V, FN, S, IO		148:17-20	N, S

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
91:21 - 91:24	BE, R, 403, E, AF, V, FN, S, IO		148:24-149:4
92:1 - 92:5	BE, D, R, 403, FN, S, IO		149:6-7
92:7 - 92:7	BE, D, R, 403, FN, S, IO		150:15-20 R
98:11 - 98:16	BE, D, R, 403, E, AF, V, MIS, FN, S, IO, LC, AA, Priv		150:22-25 R
98:25 - 99:1	R, 403, FN, S, IO, LC, Priv		151:2-13 R
99:3 - 99:4	R, 403, E, V, MIS, FN, S, IO, LC, Priv		151:25-152:3 R, N, NA
99:6 - 99:13	R, 403, E, AF, V, MIS, FN, S, IO, LC, Priv		152:5-12 R, N, NA
99:15 - 99:19	R, 403, FN, S, IO, LC, Priv		152:14-18 R, N
100:15 - 100:18	R, 403, E, AF, V, MIS, FN, S, H, IO, LC		152:20-24 R, N
100:21 - 101:2	BE, R, 403, E, V, MIS, FN, S, IO, LC		154:13-17 R, N, H
101:4 - 101:7	BE, R, 403, FN, S, H, IO		154:19-22 R, N, H
102:22 - 103:1	BE, R, 403, E, AF, V, MIS, FN, S, IO		162:13-18 R, N, H
103:4 - 103:5	R, 403, FN, S, IO,		162:20-163:5 R, N, H
103:7 - 103:8	R, 403, E, V, MIS, FN, S, IO		163:19-21 R, N, NA
103:10 - 103:17	BE, R, 403, FN, S, IO		163:25-165:6 R, N, NA
106:4 - 106:6	R, 403, E, AF, V, MIS, FN, S, H, IO, LC		165:8-17 R, N
106:8 - 106:16	R, 403, FN, S, H, IO, LC		165:19-25 R, N
108:9 - 109:24	BE, D, R, 403, E, V, FN, S		166:2-3 R, N
110:6 - 110:22	BE, D, R, 403, E, AF, V, MIS, FN, S		167:15-18 R, N

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
111:5 - 111:16	BE, D, R, 403, E, AF, V, FN, S		167:20-168:9 R, N
111:17 - 111:24	BE, D, R, 403, E, AF, V, FN, S		168:12 R, N
113:2 - 113:14	BE, D, R, 403, FN, S		190:19-25 R, N
113:19 - 113:23	BE, D, R, 403, E, AF, MIS, FN, S, IO		191:2-11 R
114:2 - 115:3	D, R, 403, E, AF, V, FN, S, IO, LC, ID		191:13-23 R
115:8 - 116:1	D, R, 403, E, V, MIS, FN, S, IO, LC, ID		191:25-192:1 R
116:14 - 117:3	D, R, 403, E, V, FN, S, IO, LC		202:21-203:15 ID, N
117:5 - 117:20	R, 403, E, V, FN, S		203:16-25 ID, N
119:1 - 119:3	BE, R, 403, E, V, MIS, FN, S, LC		205:2-14 R, N
119:8 - 119:15	BE, R, 403, E, AF, V, MIS, FN, S, LC		205:25-207:9 R, N, NA
119:18 - 120:14	BE, D, R, 403, E, AF, V, FN, S, LC, ID		207:19-22 R, N
120:22 - 120:23	BE, D, R, 403, E, AF, V, FN, S, IO, LC, ID		207:24-208:6 R, N
120:25 - 121:18	BE, D, R, 403, E, AF, V, FN, S, IO, LC, ID		208:19-20 R
121:23 - 122:3	BE, D, R, 403, E, AF, V, FN, S, IO, LC, ID		208:22-209:3 R
122:5 - 122:7	BE, D, R, 403, FN, S, IO, LC		226:1-5 R, N, NA
122:17 - 123:18	BE, D, R, 403, E, AF, V, FN, S, IO, LC		226:7-15 R, N, NA
125:2 - 125:10	BE, R, 403, E, V, MIS, FN, S, IO, LC		226:17-24 R, N, NA
125:12 - 125:19	BE, R, 403, E, V, MIS, FN, S, IO, LC		233:25-234:16
126:18 - 126:24	BE, D, R, 403, E, FN, S, IO, LC		235:1-17
130:12 - 130:13	R, 403, E, AF, V, FN, S, IO, LC		237:6-238:14 R

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
130:17 - 131:2	R, 403, E, AF, V, MIS, FN, S, IO, LC		238:16 R
131:5 - 131:12	BE, D, R, 403, E, MIS, FN, S, IO, LC		238:23-239:14 R, N
132:13 - 132:22	BE, D, R, 403, E, FN, S, IO, LC, ATTY		241:8-10 R, 403, N, NA
132:24 - 133:4	BE, D, R, 403, E, AF, V, MIS, FN, S, IO, LC		241:12-25 R, 403, N, NA
133:6 - 133:6	BE, D, R, 403, FN, S, IO, LC		
135:2 - 135:7	BE, D, R, 403, E, V, MIS, FN, S, IO, LC		
135:9 - 135:13	BE, D, R, 403, E, AF, V, MIS, FN, S, IO, LC		
135:9 - 135:9	BE, D, R, 403, E, AF, V, MIS, FN, S, IO, LC		
135:15 - 135:20	R, 403, E, V, MIS, FN, S, IO, LC		
135:22 - 136:4	R, 403, E, V, MIS, FN, S, IO, LC		
136:6 - 137:1	R, 403, E, V, MIS, FN, S, IO, LC		
137:3 - 137:6	R, 403, FN, S, IO, LC		
145:2 - 145:12	BE, D, R, 403, E, AF, V, FN, S, IO, LC		
146:2 - 146:4	BE, D, R, 403, E, AF, V, MIS, FN, S, IO, LC		
146:6 - 146:6	BE, D, R, 403, FN, S, IO, LC		
147:21 - 147:23	BE, D, R, 403, E, FN, S, IO, LC		
147:25 - 147:25	BE, D, R, 403, FN, S, IO, LC		
148:5 - 148:8	BE, D, R, 403, E, FN, S, IO, LC, ID		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
149:9 - 149:12	BE, D, R, 403, E, AF, MIS, FN, IH, S, IO, LC		
149:14 - 149:14	BE, D, R, 403, FN, IH, S, IO, LC		
149:20 - 149:23	BE, D, R, 403, E, AF, FN, S, IO, LC		
150:3 - 150:9	BE, D, R, 403, E, AF, FN, S, IO, LC		
150:11 - 150:13	BE, D, R, 403, FN, S, IO, LC		
155:5 - 155:14	BE, D, R, 403, E, AF, V, FN, S, IO, LC		
155:18 - 156:10	BE, D, R, 403, E, FN, S, IO, LC, AA		
156:25 - 157:4	R, 403, E, AF, V, FN, S, IO, LC		
157:8 - 158:3	R, 403, E, AF, V, FN, S, IO, LC		
158:5 - 158:13	R, 403, E, AF, V, MIS, FN, S, LC		
158:15 - 158:16	R, 403, FN, S, LC		
158:18 – 158:22	R, 403, E, AF, V, MIS, FN, S, LC, ATTY		
158:24 – 159:14	R, 403, FN, S, LC		
160:7 - 160:8	R, 403, E, AF, V, FN, S, LC		
160:10 - 160:22	R, 403, E, AF, V, MIS, FN, S, IO, LC, AA		
160:25 - 161:6	R, 403, E, V, MIS, FN, S, IO, LC, AA		
161:8 - 161:11	R, 403, E, AF, V, MIS, FN, S, IO, LC		
161:14 - 161:22	R, 403, E, AF, V, MIS, FN, S, IO, LC		
161:24 - 162:1	R, 403, E, V, MIS, FN, S, IO, LC		
162:3 - 162:9	R, 403, E, V, MIS, FN, S, IO, LC		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
162:11 - 162:11	R, 403, FN, S, IO, LC		
163:7 - 163:10	R, 403, E, AF, V, MIS, FN, S, H, IO, LC		
163:14 - 163:15	R, 403, E, AF, V, FN, S		
163:17 - 163:17	R, 403, FN, S		
169:6 - 169:10	R, 403, E, AF, V, MIS, FN, S, IO, LC, AA		
169:13 - 169:19	R, 403, E, AF, V, MIS, FN, S, IO, LC, AA		
169:22 - 169:22	R, 403, FN, S, IO, LC, AA		
170:14 - 170:15	R, 403, E, AF, V, MIS, FN, S, IO, LC, AA		
170:17 - 170:17	R, 403, FN, S, IO, LC, AA		
170:19 - 172:18	BE, D, R, 403, E, AF, V, MIS, FN, S, IO, LC, AA		
172:21 - 173:8	BE, D, R, 403, E, AF, FN, S, IO, LC		
173:12 - 173:24	BE, D, R, 403, E, FN, S, IO, LC		
174:1 - 174:1	BE, D, R, 403, FN, S, IO, LC		
174:21 - 175:1	BE, D, R, 403, E, V, FN, S, IO, LC		
175:5 - 175:9	BE, D, R, 403, E, V, FN, S, IO, LC		
175:11 - 175:11	BE, D, R, 403, FN, S, IO, LC		
184:24 - 185:25	BE, D, R, 403, FN, S		
186:1 - 186:23	BE, D, R, 403, FN, S, IO, ID		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
186:24 - 187:3	BE, D, R, 403, E, AF, V, FN, S, H, IO, ID		
187:4 - 187:4	BE, D, R, 403, E, V, MIS, FN, S, IO		
187:6 - 187:8	BE, D, R, 403, FN, S, IO		
187:10 - 187:18	BE, D, R, 403, E, V, FN, S, H, IO, LC		
187:21 - 188:1	BE, D, R, 403, E, AF, V, FN, S, IO, LC		
188:5 - 189:1	BE, D, R, 403, E, MIS, FN, S, IO, LC		
189:3 - 189:4	BE, D, R, 403, FN, S, IO		
189:6 - 189:16	BE, D, R, 403, E, AF, V, MIS, FN, S, IO		
189:19 - 189:19	BE, D, R, 403, FN, S, IO		
192:13 - 193:2	BE, D, R, 403, FN, S, IO		
201:24 - 202:4	BE, D, R, 403, E, FN, CD, S, IO		
202:6 - 202:6	R, 403, FN, S, IO		
202:8 - 202:20	BE, D, R, 403, FN, S, IO, ID		
208:7 - 208:13	BE, R, 403, E, MIS, FN, S, IO, AA, Arg		
208:16 - 208:17	BE, R, 403, FN, S, IO, AA		
209:4 - 209:7	BE, D, R, 403, E, V, MIS, FN, S, IO, AA		
209:9 - 209:13	BE, D, R, 403, E, V, MIS, FN, S, IO, AA		
209:15 - 209:20	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
209:22 - 210:3	BE, D, R, 403, E, V, MIS, FN, S, IO, AA, ID		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
210:22 - 211:2	BE, D, R, 403, E, V, MIS, FN, S, IO, AA, ID		
211:6 - 211:8	BE, D, R, 403, E, V, MIS, FN, S, IO, AA, ID		
211:10 - 211:14	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
211:16 - 211:25	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
212:2 - 212:9	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
212:11 - 212:16	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
212:18 - 213:7	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
213:9 - 213:17	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
213:19 - 213:23	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
213:25 - 214:4	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
214:6 - 214:11	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
214:13 - 214:17	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
214:19 - 214:23	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
214:25 - 215:5	BE, D, R, 403, E, V, MIS, FN, IH, S, IO, AA		
215:7 - 215:7	BE, D, R, 403, FN, IH, S, IO, AA		
215:15 - 215:18	BE, D, R, 403, E, FN		
216:7 - 216:14	BE, D, R, 403, E, FN, LC		
216:15 - 216:19	BE, D, R, 403, E, FN, LC		
217:7 - 218:14	BE, D, R, 403, E, AF, V, FN, S, LC		
218:16 - 218:19	BE, D, R, 403, FN, S, H, LC		
220:9 - 220:24	BE, D, R, 403, E, V, MIS, FN, S, IO, LC		
221:1 - 222:11	BE, D, R, 403, E, MIS, FN, S, IO, LC		
222:13 - 222:24	R, 403, E, AF, MIS, FN, S, IO, LC		
223:3 - 223:13	R, 403, E, V, MIS, FN, S, IO, LC		
227:1 - 227:6	BE, R, 403, E, AF, V, FN, S		
228:2 - 229:21	BE, D, R, 403, E, AF, V, FN, S, LC		
229:24 - 229:24	BE, D, R, 403, E, AF, V, FN, S, LC		
230:1 - 230:24	BE, D, R, 403, E, AF, V, FN, S, LC		
231:1 - 231:8	R, 403, E, AF, V, FN, S, IO, LC		
231:11 - 231:18	R, 403, E, AF, V, FN, S, IO, LC		
231:20 - 231:25	R, 403, E, AF, V, FN, S		
232:2 - 232:13	R, 403, E, AF, V, MIS, FN, S, IO, LC		
232:23 - 233:2	R, 403, E, AF, V, MIS, FN, S, IO		
233:5 - 233:6	R, 403, FN, S, IO		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
242:1 - 242:3	R, 403, E, MIS, FN, S, IO		
242:5 - 242:21	R, 403, E, MIS, FN, S, IO		
242:24 - 243:9	R, 403, E, MIS, FN, S, IO		
243:11 - 243:18	R, 403, E, MIS, FN, S, IO		
243:21 - 244:4	R, 403, E, MIS, FN, S, IO		

EXHIBIT 9**X. Stephen Maebius (October 31, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
8:19-22		16:18-17:7	16:18-17:7	R, 403
9:9-10:1	403, R	20:4-18	20:4-18	R, 403
10:22-11:13	403, R	22:9-12	22:9-12	R, 403
13:1-3		33:20-34:1	33:20-34:1	R, 403
14:6-19	403, R	34:11	34:11	R, 403
16:13-17	403, R, BE	37:5-6	37:5-6	ID, R
17:8-11	403, R, V	88:17-19	88:17-19	R, 403
18:10 - 18:14		89:7-8	89:7-8	R, 403
21:2-22:8	403, R, V, IH	92:1-3	92:1-3	
24:2 - 24:8	D	92:15-22	92:15-22	R, 403, H, Priv
24:10 - 24:19		132:18-19	132:18-19	R
26:12 - 27:5	403, BE, D	133:2	133:2	R
27:6 - 27:14	403, BE, D	133:4-7	133:4-7	R
27:21-28:1	403, BE, D	142: 16-19	142: 16-19	R, 403
28:10-28:12		143:7-12	143:7-12	R, 403, Priv
28:22-29:6		153:3-8	153:3-8	R, 403,
30:17 - 30:19	Priv, 403, R	158:6-8	158:6-8	R, 403, NA, ID
30:21 - 31:4	403, R	168:9-11	168:9-11	R, 403
36:19 - 37:4		168:21-169:11	168:21-169:11	R, 403
32:20-33:12	403, S	220:5-221:18	220:5-221:18	R, 403, D, IO, L
36:3-36:9	FN, S			
40:20 - 41:4	403, S			
41:21 - 42:7	E, Q, V			
43:9 - 43:11	403, R, LC, V			
43:15 - 43:15	403, R, LC			
43:17 - 43:19	403, R, LC, V			
43:21 - 43:21	403, R, LC			
44:2 - 44:4	403, R, LC, V			
44:6 - 44:6	403, R, LC			
44:8 - 44:10	403, R, LC, V			
44:12 - 16	403, R, LC			
45:4 - 46:5	403, R, LC			
46:8 - 46:9				
46:11 - 46:14	403, AA, R, LC			
46:17 - 46:17	403, AA, R, LC			

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
46:19 - 47:3	403, R, LC		
47:6 - 47:17	403, R, LC		
47:20 - 48:3	403, R, MIS, LC		
48:5 - 48:15	403, R, LC, V, IH		
49:7 - 49:12	403, AA, R, E, LC		
49:15 - 49:15	403, AA, R, LC		
49:17 - 50:1	403, R, MIS, Arg, LC		
50:6 - 50:6	403, R, LC		
52:3 - 52:9	403, AA, R, Arg, LC		
52:11 - 52:11	403, AA, R, LC		
52:16 - 52:19	V		
52:20 - 53:7	403, AA, R, Arg, V		
62:14 - 63:7	D		
63:8 - 63:17	403, BE, D		
63:18 - 63:20	403, R, Priv		
64:3 - 64:5	403, R, Priv		
64:18 - 65:9	403, R, V		
65:13 - 66:13	403, BE, D		
66:14 - 67:1	403, R, Priv, ATTY		
67:6 - 67:12	403, V		
67:14 - 68:15	403, BE, D		
73:9 - 74:6	403, Q, AF, BE, D		
74:8 - 74:12	403, BE, D, S		
75:22 - 77:13	403, BE, D		
77:14 - 78:6	403, R, Priv, ATTY		
81:8 - 81:10	403, S, V		
81:16 - 81:20	403		
82:6 - 82:20	403, ID, MIS, IH		
83:12 - 84:1	403, BE, D		
84:2 - 84:11			
85:10 - 85:12	403, Priv, S		
85:21 - 86:5	403		
87:2 - 87:4	403, R, Priv, LC, IO		
87:12 - 87:13	403, LC, IO		
87:17 - 88:16	403, R, BE, D		
90:15 - 90:17	403, R, Priv, S		
91:9 - 91:11	403, R, S		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
93:2 – 93:8	BE, D, ID		
94:14 – 94:18			
94:19 - 95:9	403, IH, E, LC		
96:21 - 97:9	D		
	403, LC, BE, D, E, 97:10 - 98:12 IO, FN		
98:13 - 98:22	403, IO, ID, FN		
99:1 - 100:1	403, BE, D, LC		
100:13 - 101:3	403, R, BE, D		
101:4 - 101:13	403, R, BE, D		
101:14 - 101:16	403, R, S, Priv		
102:6 - 102:15	403, R, LC		
102:17 - 103:3	403, Arg, LC, IO		
103:7 - 103:7	403, LC, IO		
103:14 - 103:17	403, LC, IO		
103:20 - 103:20	403, LC, IO		
103:22 - 104:2	403, LC, IO		
104:5 - 104:12	403, LC, IO		
104:13 - 104:21	403, LC, IO, V		
105:2 - 105:8	403, LC, IO		
105:15 - 106:8	403, R		
106:18 - 107:11	403, BE, D		
107:12 - 107:22	403, R, BE, D		
108:1 - 108:8	403, R, LC		
108:9 - 108:20	403, V, Arg, AA		
108:22 - 109:2	403		
109:4 - 109:18	403, LC		
109:19 – 109:22	403, Arg, Priv		
110:16 – 110:18	403, R		
111:4 – 111:7	403, R, V, IH		
111:9 – 111:10	403, R		
111:12 – 111:15	403, R, V, IH		
111:17 – 111:18	403, R		
111:20 - 112:2	403, R, V, IH		
112:4 – 112:4	403, R		
112:6 - 112:21	403, R, Arg, MIS, LC		
112:22 - 113:7	403, S		
113:11 - 113:14	403, Priv		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
114:1 - 114:2	403		
117:4 - 117:7	403, E, V, LC, IH		
117:9 - 117:16	403, E, V, LC, IH		
117:17 – 117:20	403, LC		
118:21 - 119:4	403, Priv		
119:8 - 119:15	403, LC		
120:7 – 120:15	403, LC, R, Priv		
120:18 – 120:20	403, R, Priv		
120:22 - 121:5			
121:14 - 121:17	403, Priv		
122:1 - 122:17	D		
122:18 - 122:21			
123:15 - 123:20	403, E, R, LC, IO		
124:3 - 124:7	403, R, LC, IO		
124:9 – 124:11	403, E, R, LC, IO		
124:22-125:1	403, R		
125:9 - 125:20	D		
125:21 - 126:8	403, R, D		
	403, R, D, Priv,		
126:9-127:3	ATTY, S		
127:10-127:18	403, R, D, S		
128:10-128:18	403, R, S, V		
129:18 - 129:21	403, LC, IH		
130:2 - 130:2	403, LC		
130:4 - 130:6	403, R, V		
130:14 - 130:14			
130:16 - 130:20	403, Arg		
131:2 - 131:2			
131:9 - 131:21	403, R, BE, D, LC		
132:2 - 132:4	403, R, LC		
	403, R, Arg, S, LC,		
132:6 - 132:17	BE, D		
133:8 - 133:15	403, BE, D		
133:21 - 134:5			
	403, AA, V, AF, IH,		
135:5 - 135:11	S, FN		
135:13 - 135:13	403, S, FN		
135:15 - 135:22	403, FN, S, MIS		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
136:1 - 136:11	403, BE, D, LC, IO, AF, Arg, MIS		
136:20 - 136:22	403, BE, D, LC, ID		
137:1 - 137:22	403, BE, D, LC, IO, MIS, IH, ID		
138:1 - 138:8	403, BE, D, LC, IO		
138:11 - 138:13	403, BE, D		
138:14 - 138:22	403, BE, D, AF, LC		
139:7 - 139:12	403, BE, D		
140:8-141:4	403, R, S, Priv, ATTY		
143:14 – 143:17	403, R, LC		
144:1-144:6	403, R, LC		
145:12 - 146:1	BE, D		
149:16 - 150:12	403, BE, D		
150:17 - 150:20	403, BE, D		
152:4-152:6			
152:7 - 152:22	403, IO, BE, D, ID		
153:1 - 153:2	403, IO, BE, D, ID		
153:9 - 154:1	403, BE, D, IO		
154:2 - 154:22	403, BE, D, IO, ID		
155:1 - 155:12	403, BE, D, IO, FN, ID		
155:18 - 156:13	BE, D		
157:5 - 157:19	403, BE, D		
157:20 - 158:5	403, BE, D		
158:9 - 158:19	403, BE, D		
158:22 - 159:3	403, BE, D, IO		
159:10 - 159:12	403, FN, V		
159:20 - 159:22	403		
160:16 - 160:19			
160:21 - 161:1			
161:5 - 161:18	D		
164:20-165:7	403, R, Priv, ATTY		
165:21-168:7	403, AA, R, Priv, ATTY, Q, V		
169:12-170:1	403, R, Priv, ATTY		
170:7 – 171:3	403, AA, D, ID		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
173:15-175:17	403, AA, R, BE, D, Priv, ATTY		
178:1-178:9	403, R, ID, Priv, ATTY		
178:12-181:6	403, R, Priv, LC, ATTY, BE, D		
182:2 - 182:15	D		
183:11-17	403, BE, D		
183:18 - 183:22	403, AA, LC, IO		
184:1-184:4			
184:17 - 185:2	403, R		
185:7-186:7	403, R, LC, Priv, ATTY		
186:8 - 187:2	403, E, V		
187:7 - 188:3	403, D, LC, IO		
188:4 - 188:19	403, BE, D, LC, IO		
188:22 - 188:22	403, LC, IO		
190:6 - 190:20	D, FN		
192:9-192:20	R, D, 403		
195:10-195:15	D		
196:3-196:11	403, AF, BE, D		
198:16-199:9	403, Arg, BE, D		
199:14-201:2	403, BE, D, S, AF, V		
201:8-201:19	403, BE, D		
202:17-206:15	403, R, BE, D, S, Arg, AF, LC, IO, V		
208:19 - 209:20	403, R, BE, D, Arg, AF, LC, IO		
209:22 - 210:3	403, R, BE, D		
210:5 - 210:7	403, R, Arg, AF, BE, LC, IO, AA, E		
210:9 - 210:10	403, BE, LC, IO		
210:19-211:8	403, R, BE, D, Arg, AF, LC, IO, AA		
211:10-211:11	403, R		
211:13 - 211:18	403, R, Arg, AF, LC, IO, AA		
211:20 - 211:21	403, R, LC, IO		
212:2 - 212:8	403, R, BE		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
214:6-214:20	403, R, V		

XI. Vijay Nainani (November 15, 2024)

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
5:1 - 5:9		14:1-19	14:1-19
6:14 - 7:2		22:20-23:3	22:20-23:3
13:20 - 13:22		23:11-15	23:11-15
27:13 - 27:17	403, AF, E, FN, MIS, V, Arg	27:18-20 27:22-28:7	27:18-20 R, N
41:6 - 41:19		28:16-18	27:22-28:7 R, N
48:19 - 48:19	403, E, FN, R, Scope, V	28:21-22 29:1-3	28:16-18 R
48:21 - 49:3	403, E, R, Scope, V	29:6-11	28:21-22 R
49:6 - 49:10	403, AF, D, E, FN, H, R, Scope	29:13-17 29:20-21	29:1-3 R
49:12 - 49:13	403, E, R, Scope	32:15-33:7 33:9-18	29:6-11 R
53:16 - 53:21	403, D, E, H, R, Scope, V, Q	33:20-34:8 34:10-13	29:13-17 R
54:1 - 54:3	403, D, E, H, R, Scope,	34:15 42:2-4	29:20-21 R
54:5 - 54:14	403, D, E, H, R, Scope,	42:6-9 42:12-14	32:15-33:7 R
54:16 - 54:18	403, D, E, H, R, Scope	42:16-19 56:10-12	33:9-18 R
54:20 - 54:22	403, D, E, H, R, Scope	50:15-17 60:18	33:20-34:8 R
55:2 - 55:4	403, D, E, H, R, Scope	62:8 63:6-7	34:10-13 R
55:6 - 55:8	403, D, E, H, R, Scope	63:9 63:20-64:4	34:15 R
55:10 - 55:13	403, D, E, H, R, Scope	64:6-22 65:2-3	42:2-4 R
55:15 - 55:16	403, D, E, H, R, Scope	65:12-14 68:4-5	42:6-9 R
57:2 - 57:4	403, D, E, H, R, Scope, V	68:7 70:8-12 70:14-15	42:12-14 R
57:6 - 57:8	403, D, E, H, R, Scope,	87:14-88:9	42:16-19 R

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
57:10 - 57:13	403, D, E, H, R, Scope, V, S	88:11-89:8 89:10-17 92:15-16 95:19-96:4	56:10-12 ID, R
57:16 - 57:21	403, D, E, H, R, Scope, V, S	96:6-9 96:11 97:6-9 97:11-12 97:14	50:15-17 ID, R
58:1 - 58:4	403, D, E, H, R, ScopeQ	106:2-7 106:9-107:5	60:18 ID
58:6 - 58:18	403, E, Scope, Q	107:7 110:4	62:8 ID
58:20 - 59:1	403, E, FN, R, Scope, V, S	110:6-9 110:11	63:6-7 R
59:2 - 59:6	403, E, FN, R, Scope, D, V		63:9 R
59:8 - 59:10	403, D, E, H, R, Scope		63:20-64:4 R
59:12 - 59:15	403, D, E, H, R, Scope		64:6-22 R
59:17 - 59:20	403, D, E, H, R, Scope		65:2-3 R
59:22 - 60:2	403, D, E, H, R, Scope		65:12-14 ID, R
60:4 - 60:5	403, D, E, H, R, Scope		68:4-5 R
60:7 - 60:11	403, D, E, H, R, Scope,		68:7 R
60:13 - 60:16	403, D, E, H, ID, R, Scope ID,		70:8-12 R
60:19 - 60:20	403, D, E, H, ID, R, Scope, S, ID		70:14-15 R
60:22 - 61:3	403, D, E, H, R, Scope, S		87:14-88:9 R
61:5 - 61:9	403, D, E, FN, R, Scope, S		88:11-89:8 R
61:11 - 61:17	403, E, FN, R, Scope, S		89:10-17 R
61:19 - 62:2	403, E, FN, R, Scope, S		92:15-16 ID
62:4 - 62:6	403, E, FN, R, Scope, S, ID,		95:19-96:4 ID, R
62:9 - 62:11	403, E, FN, ID, R, Scope, S, ID		96:6-9 ID, R
62:14 - 62:16	403, E, FN, R, Scope, S		96:11 ID, R

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
62:21 - 62:22	403, E, FN, R, Scope, S		97:6-9 ID, R
63:2 - 63:5	403, E, FN, Scope, S		97:11-12 ID, R
65:4 - 65:11	403, D, E, H, ID, R, Scope, V		97:14 ID, R
65:15 - 65:15	403, D, E, H, ID, R, Scope, V, ID		106:2-7 R
65:19 - 67:7	403, D, E, FN, H, R, Scope		106:9-107:5 R
67:8 - 67:20	403, D, E, FN, H, R, Scope, ID		107:7 R
68:8 - 68:10	403, D, E, FN, H, R, Scope, VS,		110:4 R
68:15 - 69:2	403, D, E, FN, H, R, Scope, V, S		110:6-9 R
69:4 - 69:8	403, D, E, FN, H, R, Scope, S		110:11 R
69:10 - 69:15	403, D, E, FN, H, R, Scope, S		
69:17 - 69:19	403, D, E, FN, H, R, Scope, S		
71:11 - 71:12	403, D, E, FN, H, V, Q		
71:11 - 72:6	403, D, E, FN, H, V, Q		
72:11 - 72:13	403, D, E, FN, H, ID		
77:16 - 77:18	403, E, R, Scope		
77:20 - 78:1	403, E, R, Scope, D		
78:3 - 78:5	403, E, R, Scope, D		
78:7 - 78:9	403, E, R, Scope, D		
86:4 - 86:17	403, D, E, H, R		
89:18 - 89:21	403, D, E, H, R, Scope, V		
90:1 - 90:16	403, D, E, H, R, Scope, V		
90:18 - 91:7	403, D, E, H, R, Scope, V		
91:8 - 91:11	403, D, E, H, R, Scope, V, FN		
91:13 - 92:14	403, D, E, H, R, Scope, V, S, FN		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
92:18 - 92:21	403, D, E, H, R, Scope, V, ID		
93:6 - 93:11	403, D, E, H, R, V		
93:13 - 94:15	403, D, E, H, R, Scope		
94:17 - 94:20	403, D, E, H, R, Scope		
94:22 - 95:2	403, D, E, H, R, Scope		
95:4 - 95:7	403, D, E, H, R, Scope		
95:9 - 95:12	403, D, E, H, R, Scope		
95:14 - 95:14	403, D, E, H, R, Scope		
96:12 - 96:21	403, D, E, H, R, Scope		
97:1 - 97:5	403, D, E, H, R, Scope		
98:6 - 98:8	403, D, E, H, R, Scope		
98:10 - 98:18	403, D, E, H, R, Scope		
98:20 - 99:1	403, D, E, H, R, Scope		
99:4 - 99:5	403, D, E, H, R, Scope		
99:14 - 100:16	403, E, R, Scope		
100:18 - 100:21	403, E, R, Scope		
101:1 - 101:2	403, E, R, Scope		
101:4 - 101:7	403, E, R, Scope		
101:9 - 101:12	403, E, R, Scope		
101:14 - 101:18	403, D, E, H, R, Scope		
101:20 - 102:5	403, D, E, H, R, Scope		
102:7 - 102:9	403, D, E, H, R, Scope		
102:11 - 102:13	403, D, E, H, R, Scope		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
102:15 - 102:17	403, D, E, H, R, Scope		
102:19 - 102:21	403, D, E, H, R, Scope		
103:1 - 103:7	403, D, E, H, R, Scope		
103:9 - 103:11	403, D, E, H, R, Scope		
103:13 - 103:15	403, D, E, H, R, Scope		
103:17 - 103:20	403, D, E, H, R, Scope		
103:22 - 104:1	403, D, E, H, R, Scope, V		
104:3 - 104:8	403, E, R, Scope, V		
104:10 - 104:13	403, E, R, Scope, V		
104:15 - 104:15	403, E, R, Scope, V		
104:22 - 105:3	403, E, R, Scope, V, MIS		
105:5 - 105:10	403, E, R, Scope, V		
105:12 - 105:15	403, E, R, Scope, V		
105:17 - 105:17	403, E, R, Scope, V		
114:12 - 114:14	403, E, FN, R, Scope, V		
114:16 - 114:16	403, E, FN, R, Scope, V		

EXHIBIT 9**XII. Kishan Parikh (September 6, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
5:20 - 5:22		25:12-17	25:12-17	R
5:23 - 6:2	R, 403	26:11-13	26:11-13	R
8:10 - 8:12	R, 403	26:15-16	26:15-16	R
8:19 - 10:10	R, 403	26:18-19	26:18-19	R
12:2 - 13:9	R, 403	26:21-22	26:21-22	R
15:14 - 16:10	R, 403	30:9-22	30:9-22	R
18:21 - 20:17	R, 403	31:10-11	31:10-11	R
23:5 - 23:10	R, 403	31:13-17	31:13-17	R
23:11 - 23:25	R, 403	31:19-20	31:19-20	R
24:1 - 24:21	R, 403, E, MIS	50:2-6	50:2-6	R, 403
24:23 - 25:11	R, 403, E, MIS	53:13-17	53:13-17	R
26:24 - 27:2	R, 403, E, MIS, AF, S	53:19-24	53:19-24	R
27:4 - 27:4	R, 403, S, IO			
27:6 - 27:13	R, 403			
31:2 - 31:9	R, 403			
32:3 - 32:16	R, 403, FN, E			
32:18 - 32:18	R, 403, FN, IO, S			
33:1 - 33:2	R, 403, MIS, E			
33:5 - 33:10	R, 403, MIS, S, E			
33:12 - 33:14	R, 403, MIS, S			
33:16 - 33:18	R, 403, E			
33:20 - 33:25	R, 403, E, S, FN			
34:2 - 34:13	R, 403, S, FN, E			
34:15 - 34:25	R, 403, S, FN, E, MIS			
35:1 - 35:1	R, 403, S, FN, MIS			
35:4 - 35:7	R, 403, S, FN, E, MIS			
35:9 - 35:10	R, 403, S, FN, MIS			
35:19 - 36:13	R, 403			
39:21 - 40:8	R, 403			
40:18 - 41:2	R, 403			
43:10 - 43:16	R, 403			
44:20 - 44:23	R, 403, E			
44:25 - 45:1	R, 403, IO, D			
46:21 - 47:9	R, 403			
47:10 - 47:11	R, 403, MIS, E			
47:13 - 47:25	R, 403, S, FN, IO			

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
48:1 - 48:14	R, 403, D, E, MIS		
48:16 - 48:25	R, 403, IO, D		
49:1 - 49:5	R, 403, E, D, MIS		
49:7 - 49:12	R, 403, IO, D, S, E		
49:14 - 49:19	R, 403, IO, D, S, E		
	R, 403, IO, D, S, E,		
49:21 - 49:25	FN		
50:10 - 50:21	R, 403		
51:1 - 51:7	R, 403, E		
51:9 - 51:12	R, 403		
51:13 - 51:18	R, 403, E, IO		
51:21 - 51:24	R, D, 403, E		
52:1 - 52:1	R, 403, IO, D		
52:19 - 52:22	R, 403, E, MIS		
52:24 - 52:24	R, 403, IO		
54:11 - 54:13	R, 403, D, E, MIS		
54:15 - 54:15	R, 403, IO, D		
54:17 - 54:20	R, 403, D, E, MIS		
54:22 - 54:22	R, 403, IO, D		
56:15 - 56:17	R, 403, E, MIS		
56:19 - 56:19	R, 403, IO		
56:21 - 56:23	R, 403, E, MIS		
56:25 - 56:25	R, 403, IO		
57:2 - 57:3	R, 403		
66:7 - 66:10	R, 403		
66:11 - 66:25	R, 403		
67:1 - 67:6	R, 403, E, D		
67:9 - 67:13	R, 403, D, IO, E, MIS		
67:15 - 67:24	R, 403, D, IO		
68:16 - 69:9	R, 403, D, E		
69:11 - 69:12	R, 403, D, IO		
70:20 - 70:24	R, 403, E, Scope		
71:1 - 71:3	R, 403, Scope, IO		
71:21 - 71:24	R, 403, V, E, Scope		
72:1 - 72:2	R, 403, IO, Q		
72:4 - 72:9	R, 403		
72:10 - 72:16	R, 403, S, E		
72:18 - 72:25	R, 403, H		
73:1 - 73:3	R, 403, H		
73:10 - 73:13	R, 403, E, S		
73:15 - 73:16	R, 403, H, D, IO		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
73:18 - 73:22	R, 403, Scope, E		
73:24 - 73:24	R, 403, Scope, IO		
74:1 - 74:10	R, 403		
75:12 - 75:16	R, 403, Scope, E, V		
75:19 - 76:1	R, 403, Scope, IO		
77:14 - 77:24	R, 403, D, MIS, ID		
78:15 - 79:1	R, 403, E, Scope		
79:3 - 79:10	R, 403, Scope, IO, E		
79:12 - 79:23	R, 403, Scope, IO, E		
79:25 - 80:9	R, 403, Scope, IO		
80:12 - 80:14	R, 403, E, Scope		
80:16 - 80:16	R, 403, IO, Scope		
80:18 - 80:23	R, 403		
81:5 - 81:12	R, 403, D, E, Scope		
81:14 - 81:23	R, 403, D, IO, Scope		
82:1 - 82:5	R, 403, D, E, Scope		
82:7 - 82:13	R, 403, D, IO, Scope		
82:16 - 82:25	R, 403, S, FN		
83:1 - 83:2	R, 403, V, E, D		
83:4 - 83:17	R, 403, IO, D, E		
83:19 - 83:25	R, 403, IO, D, ID, E		
84:1 - 84:3	ID, R, 403, E, D		
84:5 - 84:14	R, 403, IO, D, MIS, E		
84:16 - 84:16	R, 403, IO		
84:20 - 84:24	R, 403, Scope, E		
85:1 - 85:2	R, 403, Scope, IO		

EXHIBIT 9**XIII. Brian Patterson (November 5, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
8:4 - 8:12		24:16-17	24:16-17 R, N
14:7 - 14:8		24:20-21	24:20-21 R, N
14:20 - 18:9	403, E, R	26:2-9	26:2-9 R, N
18:11 - 18:11	403, E, R	27:18-20	27:18-20 R, N
	403, E, R, Scope, V, FN	27:22-28:1	27:22-28:1 R, N
20:2 - 20:2		34:13-16	
20:7 - 20:13	403, E, R, Scope, V, FN	34:19-20	34:13-16 R, N
20:15 - 20:15	403, E, R, Scope	45:15-17	
20:16 - 20:17	403, E, R, Scope	69:21-70:2	34:19-20 R, N
20:19 - 20:19	403, E, R, Scope	70:4-8	45:15-17 ID
21:1 - 21:2	403, E, R, Scope	78:16-17	69:21-70:2 R, N, ID
21:4 - 21:5	403, E, R, Scope	79:11-12	70:4-8 R, N, ID
21:6 - 21:7	403, E, R, Scope	85:2-4	78:16-17 ID, R
21:9 - 21:10	403, E, R, Scope	85:8-9	79:11-12 ID, R
	403, E, R, Scope, V, FN	85:12-18	85:2-4 ID, R, N
21:12 - 23:15		90:11-20	85:8-9 ID, R, N
	403, E, R, Scope, V, FN	90:22	85:12-18 ID, R, N
23:18 - 23:19			90:11-20 ID, R
24:12 - 24:13	403, E, R, Scope, V, FN, S		90:22 ID, R
24:15 - 24:15	403, E, R, Scope, V, FN		
24:22 - 25:8	403, E, R, S, Scope V, FN		
26:10 - 26:13	403, E, R, S, Scope, V, Arg, FN		
26:16 - 26:21	403, E, R, S, Scope, FN		
26:22 - 27:14	403, E, R, S, Scope V, FN,		
27:17 - 27:17	403, E, R, S, Scope, V, FN		
28:2 - 28:4	403, E, R, S, Scope, FN		
28:7 - 28:9	403, E, R, Scope, FN		
29:4 - 29:16	403, E, R, Scope FN,		
32:9 - 32:20	403, E, MIS, R, ScopeFN		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
34:21 - 35:5	403, E, R, S, Scope		
35:8 - 35:10	403, E, FN, R, S, Scope		
36:21 - 37:1	403, E, R, Scope, V, FN		
37:3 - 37:6	403, E, R, Scope, V, FN, S		
37:9 - 37:12	403, E, R, Scope, S, FN		
37:14 - 37:16	403, E, R, Scope, V		
37:18 - 37:20	403, E, R, Scope, V		
37:22 - 38:1	403, E, R, Scope		
43:9 - 44:1	403, D, E, FN, H, R, Scope		
44:7 - 44:13	403, D, E, FN, H, R, Scope		
44:16 - 44:19	403, D, E, FN, H, R, Scope		
44:22 - 45:9	403, D, E, FN, H, ID, R, Scope, AA		
45:19 - 46:2	403, D, E, FN, H, ID, R Scope, AA		
46:4 - 46:12	403, D, E, FN, H, R, Scope		
46:14 - 47:12	403, D, E, FN, H, R, Scope		
47:15 - 49:6	403, D, E, FN, H, R, Scope		
50:8 - 50:10	403, E, FN, R, Scope, V		
50:12 - 51:2	403, E, FN, R, Scope, V		
51:4 - 51:13	403, E, FN, R, Scope, V		
51:15 - 51:17	403, E, FN, R, Scope, V		
52:4 - 52:6	403, E, FN, R, MIS		
52:8 - 53:7	403, E, FN, R, S, Scope		
53:10 - 53:15	403, E, FN, R, Scope, V, S		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
53:17 - 53:21	403, E, FN, H, R, V, S		
54:1 - 54:5	403, D, E, FN, R, MIS, Scope, S		
54:7 - 55:9	403, D, E, FN, H, R, Scope, S		
55:12 - 55:12	403, D, E, FN, H, R		
56:8 - 56:11	403, D, E, FN, R, Q, Scope		
56:16 - 58:3	403, D, E, FN, H, R, Scope		
58:6 - 58:17	403, D, E, FN, R, Scope, V, MIS		
58:19 - 59:7	403, D, E, FN, R, Scope		
59:9 - 59:14	403, E, FN, S, R, Scope		
59:16 - 60:2	403, E, R, Scope, S		
60:4 - 60:10	403, E, R, Scope,		
60:13 - 60:16	403, E, S, R, Scope, V		
60:19 - 60:19	403, E, S, R. Scope, V		
64:5 - 64:22	403, D, E, FN, H, R, Scope		
65:2 - 69:3	403, D, E, H, R, LC, Scope		
69:9 - 69:14	403, D, E, FN, H, R, LC, ScopeS		
71:2 - 71:6	403, D, E, FN, H, R, Scope, Q		
71:12 - 72:9	403, D, E, FN, H, R, Scope, S		
72:11 - 72:14	403, D, E, FN, H, R, Scope, S		
72:16 - 72:18	403, D, E, FN, H, R, Scope, S		
72:20 - 73:2	403, D, E, FN, H, R, Scope, S		
73:4 - 73:5	403, D, E, FN, H, R, Scope S,		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
73:7 - 73:9	403, D, E, FN, H, R, Scope, S		
73:11 - 73:14	403, D, E, FN, H, R, Scope, S		
73:16 - 73:21	403, D, E, FN, H, R, Scope, S		
74:1 - 74:8	403, D, E, FN, H, R, Scope, S		
74:10 - 74:16	403, D, E, FN, H, R, Scope, S		
74:18 - 75:3	403, D, E, FN, H, R, Scope, S		
75:6 - 75:7	403, E, FN, R, Scope, S		
75:22 - 76:2	403, D, E, FN, H, Scope, V, S		
76:5 - 76:5	403, E, FN, R, Scope, S		
76:13 - 76:15	403, D, E, FN, H, R, Scope		
76:18 - 76:22	403, D, E, FN, H, R, Scope		
77:2 - 77:3	403, D, E, FN, H, R, Scope		
77:5 - 77:5	403, D, E, FN, H, R, Scope		
78:6 - 78:12	403, D, E, FN, H, Scope, Q		
79:11 - 79:12	403, D, E, FN, H, R, ID, Scope		
79:15 - 80:5	403, D, E, FN, H, R, Scope, S		
80:8 - 80:13	403, D, E, FN, H, S, R, Scope, S		
81:21 - 81:22	403, E, FN, S, R, Scope		
82:3 - 82:5	403, E, FN, S, R, Scope		
82:7 - 82:9	403, E, FN, S, R, Scope		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
82:11 - 82:13	403, E, FN, H, S, R, Scope		
83:18 - 84:2	403, E, FN, H, S, R, Scope, V, Q, Arg		
84:4 - 84:18	403, E, FN, H, S, R, Scope, V		
84:21 - 85:1	403, E, FN, H, S, R, Scope, V		
86:15 - 86:17	403, E, FN, S, R, Scope, V		
86:20 - 86:20	403, E, FN, S, R, Scope, V		
87:6 - 87:7	403, E, FN, S, R, Scope, V		
87:10 - 87:10	403, E, FN, S, R, Scope, V		

EXHIBIT 9**XIV. Rajan Saggar (September 17, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
8:14 - 8:24		20:1-16	20:1-16
10:10 - 10:12		21:9-21	21:9-21 ID
11:2 - 11:16	R, 403, D	21:24-25	21:24-25 ID, R
11:17 - 12:8	R, 403, D	53:23-25	53:23-25 ID, R
12:12 - 12:20	R, 403	56:2-6	56:2-6 ID, R
13:13 - 15:19	R, 403, B	56:8-10	56:8-10 ID, R
15:20 - 16:15	R, 403, B, NA	85:17-18	85:17-18 ID, R
16:16 - 17:10	R, 403	100:5-14	100:5-14 ID, R
17:11 - 17:21	R, 403	155:1-3	155:1-3 ID, R
17:22 - 17:25	R, 403	155:5-8	155:5-8 ID, R
19:7 - 20:16	R, 403	155:10-21	155:10-21 ID, R
20:17 - 21:18	R, 403		
22:10 - 24:6	NA, IO, R, 403, LC, FN, H		
24:8 - 24:12	R, 403, IO, LC		
24:14 - 24:25	S, FN, 403, IO, LC, H, E		
25:2 - 25:17	S, FN, 403, IO, LC, H		
25:19 - 26:9	H, R, 403, FN, IO, L, LC, E		
26:11 - 27:4	IO, FN, BE		
27:6 - 27:17	IO, FN, BE		
27:19 - 28:4	403, S, FN, LC, H		
28:6 - 28:12	403, S, FN, LC, H		
28:14 - 28:19	403, H, S, FN, LC		
28:21 - 29:12	403, H, S, FN, IO, LC		
29:13 - 29:16	403, R, MIS, E, LC		
29:18 - 30:20	403, IO, NA, R, LC, S		
30:21 - 31:2	403, IO, MIS		
31:4 - 31:13	403, IO, R, S		
31:15 - 31:25	403, FN, R, IO, H, S, V		
32:2 - 32:5	403, H, R, S, FN, V, IO		
32:7 - 32:25	403, H, R, S, FN, V, IO, NA		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
33:8 - 33:11	MIS, E, IO, LC		
33:13 - 33:15	E, IO, LC		
33:17 - 33:21	E, IO, LC		
33:24 - 34:23	IO, S, FN, LC, ATTY, V		
35:17 - 36:5	403, D, IO, MIS, LC		
36:7 - 36:7	403, D, IO		
36:8 - 36:14	403, IO, MIS, E, LC		
36:16 - 36:19	403, IO, MIS, E, LC		
36:21 - 36:23	403, IO, MIS, E, LC		
36:25 - 37:21	403, IO, NA, E, LC		
38:4 - 38:15	MIS, E, D, FN, R		
38:17 - 38:17	FN, R, D		
39:1 - 39:18	FN, IO, E, MIS, LC, IO		
39:21 - 39:25	R, 403, LC, IO		
40:7 - 40:16	403, LC, D, E		
40:18 - 42:3	403, LC, IO, D, NA		
43:15 - 43:17	403, E, FN, R, IO		
43:19 - 44:24	403, R, IO, NA, 403, E, S		
45:1 - 45:13	403, R, IO, S, FN		
45:15 - 45:18	403, R, IO, S, FN, E		
45:20 - 45:22	403, R, IO, S, FN, IO, V		
45:24 - 46:20	403, R, S, FN, IO, NA, N		
46:21 - 46:24	403, R, 403, D, IO		
47:12 - 47:19	R, 403, D, IO, LC		
47:22 - 48:22	403, IO, LC, E, R, D		
48:24 - 49:15	403, IO, D, R, E, LC		
49:16 - 49:22	403, D, IO, R, E, LC		
49:24 - 50:14	403, E, R, D, IO, LC		
50:16 - 51:20	403, D, IO, R, E, LC		
51:22 - 52:8	403, E, R, D, IO		
52:10 - 52:21	D, IO, R, 403, D		
57:10 - 57:14	MIS, E, R		
57:16 - 57:20	IO, S, FN		
61:15 - 62:11	R, 403, D		
64:11 - 65:4	403, IO, LC, V, E, FN		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
65:6 - 65:11	FN, IO, S, IH, 403, H		
65:14 - 66:4	IO, FN, S, 403, NR		
66:5 - 67:2	E, D, MIS, IO, NA, N		
67:4 - 70:17	NA, NR, R, 403, S, FN, Scope, MIS, H, IO		
70:19 - 71:1	FN, 403, R, Scope, IO		
71:3 - 72:24	FN, IO, Scope, R, 403, NA, N, H		
73:2 - 73:4	E, R, 403		
73:6 - 73:20	S, R, 403		
73:22 - 74:23	S, R, 403		
74:25 - 75:7	S, R, 403		
82:2 - 82:12	E, 403, AF, D		
82:15 - 82:18	R, 403		
83:6 - 83:12	R, 403, E		
83:14 - 83:23	H, R, 403		
83:25 - 84:2	E, R, 403		
84:4 - 84:4	H, R, 403		
84:7 - 84:8	E, R, 403, D		
84:10 - 84:10	R, 403, D		
85:11 - 85:13	R, 403		
85:15 - 85:15	R, 403		
86:9 - 86:13	R, 403, Scope, E, IO, AF, MIS, LC		
86:16 - 88:17	R, 403		
88:18 - 88:22	MIS, E, 403, R		
88:24 - 89:2	S, R, 403		
90:2 - 90:24	R, 403		
90:25 - 91:1	H, E, 403, R, Scope		
91:2 - 91:5	H, IO, 403, R, Scope, S		
91:7 - 91:9	E, 403, R, Scope		
91:11 - 91:12	403, R, Scope, S		
91:14 - 91:16	H, E, 403, R, Scope		
91:19 - 92:7	H, IO, 403, R, Scope, S		
92:8 - 92:10	H, E, 403, R, Scope		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
92:12 - 93:12	H, IO, 403, R, Scope, S, NA,		
94:2 - 94:17	H, E, 403, R, Scope		
94:19 - 95:21	H, IO, 403, R, Scope, S, NA, N		
95:23 - 96:3	H, E, 403, R, Scope		
96:5 - 96:20	H, IO, 403, R, Scope, S, NA, N		
96:21 - 97:1	R, 403, E		
97:3 - 97:8	H, E, 403, R, Scope		
97:10 - 97:18	H, E, 403, R, Scope		
97:20 - 98:23	H, IO, 403, R, Scope, S, NA, N		
98:25 - 99:6	H, E, 403, R, Scope, V		
99:8 - 99:8	H, R, 403, Scope, S		
100:16 - 100:21	H, E, 403, R, Scope, V		
100:23 - 101:8	H, R, 403, Scope, S		
109:7 - 109:18	FN, Scope, R, 403, E		
109:20 - 109:21	FN, Scope, R, 403		
109:25 - 110:6	R, 403		
110:23 - 110:25	D, Scope, R, 403		
111:2 - 111:5	D, Scope, R, 403		
112:10 - 112:25	R, 403		
118:7 - 118:13	Scope, R, 403, E		
118:15 - 118:25	Scope, R, 403, E, H		
119:2 - 119:21	Scope, R, 403, H, S		
122:24 - 123:4	ID, Scope, R, 403, E, H		
123:6 - 123:25	Scope, R, 403, H, S, NA		
124:1 - 124:8	R, 403		
124:17 - 124:21	403, R, D		
124:24 - 125:6	D, S, E, R, ID		
125:9 - 126:7	R, 403, E, D		
126:9 - 127:2	R, 403, D		
129:11 - 129:17	MIS, R, 403, E		
129:19 - 130:8	R, 403, H, S, E		
130:10 - 131:2	R, 403, H, S		
131:4 - 131:12	MIS, R, 403, H, S, E		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
131:14 - 131:19	MIS, R, 403, H, S, E		
131:21 - 131:21	MIS, R, 403, H, S		
132:15 – 132:17	D, R, 403, IO, LC		
132:19 - 133:8	D, R, 403, IO, LC		
133:10 - 133:14	R, 403, D		
137:6 - 137:18	D, 403, R, E		
137:20 - 139:14	D, 403, R, IO, NA, N		
142:7 - 142:10	D, 403, R, E		
142:12 - 143:2	D, 403, R, IO, E		
143:4 - 143:16	403, R, S, Scope, V		
143:18 - 143:23	403, R, S, Scope		
150:9 - 150:18	R, 403		
150:19 - 151:6	D, R, 403, E, IO, LC		
151:8 - 152:3	D, R, 403, IO, LC, V, NA		
152:4 - 152:7	D, R, 403, E, IO, LC		
152:9 - 153:25	D, R, 403, IO		
154:1 - 154:19	R, 403, IO, LC		
155:22 - 155:25	R, 403, H, S, E, IO, LC		
156:2 - 157:22	R, 403, H, S, NA, N		
158:7 - 158:25	R, 403, E, Scope		
159:2 - 160:1	R, 403, IO, Scope		
161:24 - 162:3	MIS, R, 403, E		
162:5 - 162:25	IO, R, 403		
163:1 - 163:2	IO, R, 403		
163:3 - 163:5	R, 403, E, D		
163:7 - 163:15	D, IO, R, 403		
165:9 – 165:15	R, 403		
168:22 - 170:3	D, R, 403, IO		
170:22 - 170:25	R, 403, Scope		
171:2 - 171:15	R, 403, S, FN, Scope		
171:17 - 172:18	R, 403, S, FN, Scope, IO		
172:20 - 174:7	R, 403, S, FN, Scope, IO, NA		
176:19 - 177:15	R, 403, Scope, IO		
176:24 - 178:7	ID, 403, Scope, IO, R		
178:10 - 178:10	403, Scope, R, IO		
178:12 - 178:14	403, Scope, IO, R		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
178:16 - 178:22	403, Scope, E, R, V, IO		
178:24 - 179:12	403, Scope, IO, R		
179:14 - 179:15	403, Scope, IO, R		
179:16 - 180:6	403, Scope, E, R, V, IO		
180:8 - 180:11	403, Scope, IO, R		
180:24 - 181:7	R, 403		

EXHIBIT 9**XV. Rajan Saggar (November 20, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
10:11 - 10:13		170:13-16	170:13-16 CD, ID, R
12:2 - 12:4	R, 403	186:15- 187:13	186:15- FN, L, R, ID, 187:13 CD, V
159:8 - 159:14		187:16-17	187:16-17 FN, L, R, ID, CD, V
159:16 - 161:7	R, 403	188:11-12	188:11-12 V, R, ID
161:14 - 163:2		188:14-15	188:14-15 V, R, ID
167:13 - 168:12	R, 403, ATTY, IO	189:1-4	189:1-4 L, V, ID, R
169:2 - 169:14	R, 403, IO		
169:15 - 170:12	R, 403, IO		
176:24 - 178:18	R, 403, IO		
179:21 - 180:8	R, 403		
186:8 - 186:14	R, 403		
187:20 - 188:10	R, 403		
188:16 - 188:25	R, 403		
189:22 - 190:3	R, 403, V, E		
190:5 - 190:12	R, 403, V, E, IO, S, LC		
190:15 - 190:22	R, 403, IO, S		
192:7 – 192:10	R, 403, V, E, IO, S, LC		
192:12 – 192:24	R, 403, IO, S, LC		
203:16 - 203:19	MIS, R, 403, E, ID		
203:23 - 203:25	MIS, R, 403, E		
204:2 - 205:1	R, 403, IO, NA, FN, LC		
205:4 - 205:20	R, 403, IO, NA, FN, LC		

EXHIBIT 9**XVI. Rajan Saggar (April 11, 2025)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
7:11 - 7:15		48:25-49:9	48:25-49:9	403, R
11:2 - 11:24	R, 403			
18:9 - 19:4	R, 403			
20:3 - 20:4	R, 403			
21:7 - 21:13	R, 403			
22:2 - 22:16	R, 403			
27:18 - 28:11	R, 403			
33:21 - 34:9	R, 403			
34:21 - 34:25	R, 403			
36:22 - 38:19	R, 403			
46:1 - 47:4	R, 403			
48:1 - 48:24	R, 403			
50:21 - 51:11	R, 403, V, E			
51:13 - 51:15	R, 403, E, V			
51:17 - 52:23	R, 403, NA, E, IO			
52:25 - 53:2	R, 403, E, AF, FN, 611			
53:6 - 53:8	R, 403, E, FN, 611			
53:11 - 53:15	R, 403, AF, 611, E			
53:21 - 54:6	R, 403, IO, AF, 611, E			
54:9 - 55:2	R, 403, IO, 611, E, V, L, FN			
55:7 - 56:3	R, 403, D, E, 611, FN			
56:5 - 56:16	R, 403, D, E, FN, IO, 611			
56:21 - 56:23	R, 403, D, E, FN, IO, 611			
57:3 - 57:8	R, 403, D, E, FN, IO, 611			
57:10 - 57:12	R, 403, FN, L, E			
57:14 - 58:3	R, 403, FN, L, E			
58:5 - 59:1	R, 403, FN, L, E			
59:3 - 59:3	R, 403, FN, L, E			
60:7 - 60:13	R, 403, L, E			
60:16 - 60:20	R, 403, L, E			
60:23 - 61:9	R, 403, E, MIS, 611			
61:11 - 61:14	R, 403, E, 611			
61:17 - 61:22	R, 403, E, MIS			

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
61:25 - 62:3	R, 403, E, L		
62:5 - 62:9	R, 403, E, L		
62:11 - 62:15	R, 403, E, 611		
62:18 - 62:19	R, 403, E, 611		
62:21 - 62:21	R, 403, E, 611		
63:19 - 64:18	R, 403		

EXHIBIT 9**XVII. Peter Smith (November 13, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
9:9 - 9:15		46:14-18	46:14-18
9:18 - 9:25		52:17-25	52:17-25 ID, R, H
20:12 - 20:20	D, H	59:13-14	59:13-14 ID, R
22:3 - 22:12	403, E	59:16-19	59:16-19 ID, R
22:24 - 23:12	403, E	60:5-6	60:5-6 R
23:20 - 23:25	403, E	60:8-9	60:8-9 R
24:21 - 25:1	403, E, S, FN	60:20-21	60:20-21 R
28:16 - 29:4	403, E, S	60:23-61:3	60:23-61:3 R
34:3 - 35:3	403, E, MIS, B	99:15	99:15 ID, R
35:14 - 35:19	403, E	119:7-9	119:7-9 R
37:13 - 37:25	D, H, MIS	119:11-19	119:11-19 R
38:15 - 38:17	D, H, 403, Priv	119:21-23	119:21-23 R, N
38:23 - 39:8	D, H, 403, Priv	124:12-15	124:12-15 ID, R
39:9 - 39:12	D, H, 403, Priv	124:17-21	124:17-21 ID, R, N
40:2 - 40:11	D, H, 403	124:23-125:2	124:23-125:2 ID, R, N
42:8 - 42:12	403, Priv, E	128:3-6	128:3-6 403, R, N
46:19 - 46:21	403, LC, E, Priv	128:8-18	128:8-18 403, R, N
47:3 - 47:11	403, LC, E, Priv	133:18-21	133:18-21 R
47:15 - 47:22	D, H, 403, LC	161:19-20	161:19-20 R, 403
47:24 - 48:4	D, H, 403, LC	161:22-162:1	161:22-162:1 R, 403
48:5 - 48:7	D, H, 403, LC	164:3-7	164:3-7 IO, R, N, NA
48:9 - 48:20	D, H, 403, LC	164:9-165:6	164:9-165:6 IO, R, N, NA
48:22 - 49:16	D, H, 403, MIS, LC	172:14-17	172:14-17 IO, R, N, NA
50:1 - 50:14	403, LC, MIS, S, ATTY	172:19-173:1	172:19-173:1 IO, R, N, NA
50:16 - 50:16	403, LC, MIS, S	181:2-11	
53:13 - 54:11	D, H, 403	181:13-	
54:13 - 55:12	D, H, 403, ATTY, MIL	182:12	181:2-11 R, N
55:14 - 56:12	D, H, 403, MIL	182:14-18	181:13-182:12 R, N
56:14 - 57:3	D, H, 403, MIL	182:20-21	182:14-18 R, N
57:5 - 59:8	D, H, 403, MIL, LC	182:23-183:2	
61:7 - 61:19	D, H, 403	183:4-8	182:20-21 R, N
61:21 - 62:11	D, H, 403, S, FN	183:10-14	182:23-183:2 D, N, R
62:13 - 65:1	D, H, 403	192:14-18	183:4-8 N, R
65:9 - 66:4	D, H, 403, S, FN	194:11	183:10-14 R, N
66:7 - 66:12	D, H, 403, S, FN	195:14-15	192:14-18 R
66:14 - 67:12	D, H, 403, S, Priv	234:1-18	194:11 ID
		234:22-235:9	195:14-15 R
		236:14-23	234:1-18 ID, R, NA
		237:6-8	234:22-235:9 R, N, H

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
67:18 - 69:1	D, H, 403, FN, S, MIS	238:15-17 238:21-239:1	236:14-23 LC, IO, R
69:3 - 69:17	D, H, 403, S, FN	239:9-12	237:6-8 LC, IO, R
69:19 - 70:1	D, H, E, 403	239:16-	238:15-17 FN, S, V
70:3 - 70:15	D, H, E, 403	240:10	238:21-239:1 FN, S, V
70:17 - 71:22	D, H, 403, E, MIS	241:9-10	239:9-12 FN, R
71:24 - 72:4	D, H, 403, E, MIS, LC	241:12-16	239:16-240:10 FN, R, 403
72:6 - 72:9	D, H, 403, E, MIS, LC	241:18- 242:22 243:21	241:9-10 R
72:11 - 72:16	D, H, 403, E, MIS, L	243:23-244:2	241:12-16 R
72:18 - 72:18	D, H, 403, E, MIS		241:18-242:22 R
73:22 - 75:20	D, H, 403, E		243:21 R
76:1 - 77:6	H, R, 403		243:23-244:2 R
77:15 - 77:18	D, H, 403		
77:20 - 79:10	D, H, 403		
80:19 - 80:21	D, H, 403, S, FN, MIS		
80:23 - 81:8	D, H, 403, S, FN, MIS		
81:10 - 81:19	D, H, 403, S, FN, MIS		
81:21 - 82:13	D, H, 403, S, FN, MIS		
82:15 - 82:17	D, H, 403, S, FN, MIS		
88:10 - 93:6	403, E, H, FN, S, LC		
97:14 - 99:7	D, H, MIS, E		
99:9 - 99:12	D, H, MIS, E, S, FN		
99:21 - 101:15	D, H, MIS, E, S, FN		
101:18 - 101:20	D, H, 403, MIS, E, S		
101:22 - 102:19	D, H, 403		
102:21 - 102:21	D, H, 403		
102:22 - 103:4	D, H, 403		
103:6 - 103:12	D, H, 403, LC		
103:14 - 103:22	D, H, 403, LC		
103:24 - 104:1	D, H, 403, L, ATTY		
104:2 - 104:8	D, H, 403, MIS, LC		
104:10 - 104:15	D, H, 403, MIS, LC		
104:17 - 104:23	D, H, 403, MIS, LC		
104:25 - 106:17	D, H, 403, MIS, LC		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
106:19 - 107:13	D, H, 403		
107:15 - 107:17	D, H, 403		
107:19 - 108:11	D, H, 403		
108:19 - 109:4	D, H, 403, FN, S		
110:18 - 111:11	D, H, E, IO		
111:13 - 111:18	D, H, E, IO		
111:20 - 112:10	D, H, E, IO		
112:12 - 113:7	D, H, E, IO		
113:9 - 113:19	D, H, E, IO		
113:21 - 114:10	D, H, E, IO		
114:12 - 114:20	D, H, E, IO		
114:22 - 115:2	D, H, E, IO		
115:4 - 115:16	D, H, E, IO		
115:18 - 115:23	D, H, E, IO		
115:25 - 116:3	D, H, E, IO		
116:5 - 116:8	D, H, E, IO, S		
116:15 - 117:1	D, H, E, IO, S		
117:3 - 117:6	D, H, E, IO, S		
117:8 - 117:18	D, H, E, IO, S		
117:20 - 118:2	D, H, E, IO, S		
118:4 - 118:11	D, H, E, IO, S		
118:13 - 118:25	D, H, E, IO, S		
119:2 - 119:4	D, H, E, IO, S		
119:6 - 119:6	D, H, E, IO, S		
119:24 - 120:1	D, H, 403, S, FN		
120:3 - 120:7	D, H, 403, S, FN		
120:19 - 120:25	D, H, 403, FN, S		
121:13 - 121:16	D, H, 403, FN, S		
121:18 - 121:22	D, H, 403, FN, S		
121:23 - 121:25	D, H, 403, FN, S		
122:8 - 123:3	D, H, 403, FN, S		
125:3 - 125:4	D, H, 403, FN, S, AA		
125:6 - 125:25	D, H, 403, FN, S		
126:2 - 126:8	D, H, 403, FN, S		
126:10 - 126:10	D, H, 403, FN, S		
126:11 - 126:15	D, H, 403, FN, S		
126:17 - 127:5	D, H, 403, FN, S		
127:7 - 127:13	D, H, 403, FN, S		
127:15 - 127:16	D, H, 403, FN, S		
129:1 - 129:3	403, E, FN		
129:5 - 129:6	403, E, FN		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
129:16 - 131:5	D, H, FN, LC		
132:12 - 133:4	D, H, FN, LC		
133:24 - 134:2	D, H, FN, LC		
134:9 - 134:21	D, H, FN, LC		
135:11 - 135:16	D, H, LC		
135:22 - 136:1	D, H, LC		
136:13 - 136:18	D, H, LC		
137:5 - 138:5	D, H, LC		
138:7 - 139:6	D, H, LC		
139:8 - 139:9	D, H, LC		
140:14 - 141:12	MIS, FN, S		
141:18 - 142:16	D, H, FN		
142:18 - 142:22	D, H, FN		
142:24 - 143:8	D, H, FN		
145:7 - 146:25	D, H, FN, AA		
147:11 - 148:11	D, H, FN, AA		
148:13 - 148:21	D, H, FN, AA		
148:23 - 149:24	D, H, FN, AA		
150:1 - 150:7	D, H, FN, AA		
150:10 - 150:15	D, H, FN, AA		
151:9 - 151:25	403, E, S, LC		
152:1 - 152:7	403, E, S, LC		
155:2 - 156:8	D, H		
157:23 - 159:19	D, H, S		
159:21 - 160:6	D, H, S		
160:7 - 161:18	D, H, S		
162:10 - 163:3	D, H		
163:5 - 164:2	D, H		
165:7 - 165:10	403, E, S		
165:12 - 165:16	403, E, S		
166:3 - 166:7	403, E, S		
166:9 - 166:11	403, E, S		
167:3 - 167:6	403, E, S		
167:8 - 167:24	403, E, S		
168:1 - 168:10	403, E, S		
168:12 - 168:13	403, E, S		
170:4 - 170:22	403, S, R		
170:24 - 171:8	403, S, R		
171:10 - 171:13	403, S, R		
173:10 - 173:13	403, MIS, S, E, Arg, AA		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
173:15 - 173:16	403, MIS, S, E, Arg, AA		
174:2 - 174:22	D, H		
174:2 - 175:5	D, H		
176:11 - 178:2	D, H, S		
178:4 - 178:21	D, H, S		
179:3 - 179:19	D, H, S		
179:21 - 180:8	D, H, S		
180:10 - 180:15	D, H, S		
180:16 - 181:1	D, H, S		
183:15 - 184:6	D, H, MIS, E		
185:4 - 185:19	D, H		
185:25 - 186:4	D, H		
186:6 - 187:3	D, H		
187:12 - 187:13	D, H, 403, S		
187:15 - 187:18	D, H, 403, S		
187:20 - 188:18	D, H, 403, S		
188:20 - 188:24	D, H, 403, S		
189:1 - 189:2	D, H, 403, S		
189:3 - 190:13	D, H, 403, S		
190:15 - 190:17	D, H, 403, S		
190:19 - 191:9	D, H, 403, S		
192:1 - 192:4	D, H, 403, S		
193:19 - 193:21	D, H, 403, S		
193:25 - 194:9	D, H, 403, S		
194:12 - 194:23	D, H, 403, S		
199:7 - 200:2	D, H, FN, S		
200:6 - 200:21	D, H, FN, S		
201:8 - 202:1	D, H, FN, S		
202:15 - 202:24	D, H, FN, S		
203:1 - 203:14	D, H, FN, S		
203:23 - 205:7	D, H, FN, E, S		
205:9 - 206:22	D, H, FN, E, S		
206:24 - 207:4	D, H, FN, E, S		
207:6 - 207:15	D, H, FN, E, S		
207:17 - 207:20	D, H, FN, E, S		
208:8 - 208:11	D, H, FN, E, S		
208:18 - 209:19	D, H, S		
212:20 - 212:21	D, H, S		
212:23 - 214:3	D, H, S		
214:11 - 215:11	D, H, 403, R		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
215:13 - 216:6	D, H, 403, R		
216:8 - 216:16	D, H, 403, R		
220:1 - 221:3	D, H, S		
223:21 - 224:24	D, H, 403		
225:1 - 225:7	D, H, 403		
225:9 - 227:1	D, H, 403		
227:3 - 227:17	D, H, 403		
227:19 - 228:2	D, H, 403		
228:4 - 228:25	D, H, 403, FN		
229:2 - 229:15	D, H, 403		
229:18 - 230:9	D, H, 403, LC		
230:11 - 230:18	D, 403, L, H, IH		
230:19 - 230:22	D, 403, L, H, IH		
230:24 - 231:14	D, 403, L, H, IH		
231:16 - 232:9	D, 403, L, H, IH		
232:11 - 232:24	D, 403, L, H, IH, ID		
233:2 - 233:5	D, 403, L, H, IH, ID		
233:7 - 233:10	D, 403, L, H, IH		
235:20 - 236:13	ID, 403, H		
237:9 - 237:18	ID, 403, H, LC		
239:2 - 239:8	ID, 403, R		
240:15 - 240:23	403, R, IH		
240:25 - 240:25	403, FN, R, IH		
243:2 - 243:7	403, FN, 611, LC		
243:9 - 243:20	403, FN, 611, LC		
9:5-6	ID		
16:12-14	R, E		
16:25-17:2	R, E		
19:3-11	D, H		

EXHIBIT 9**XVIII. Shaun Snader (November 26, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
12:24 - 13:2		37:1-9	37:1-9	R
18:6 - 18:13	R, 403, D	38:14-19	38:14-19	
18:23 - 19:7	D	38:21-23	38:21-23	R
20:20 - 21:5	R, 403, ID, LC	73:14-17	73:14-17	
21:8 - 21:17	R, 403, ID, LC	73:20	73:20	ID, R
21:20 - 21:23	R, 403, ID, LC	77:13-16	77:13-16	R
22:1 - 22:8	R, 403, ID, LC	77:22	77:22	R
22:9 - 22:14	R, 403, ID, LC	77:24-78:4	77:24-78:4	R
22:17 - 23:1	R, 403, ID, LC	78:7-8	78:7-8	R
23:3 - 23:8	R, 403, ID, LC	80:9-11	80:9-11	R
23:11 - 24:14	R, 403, D	80:14-15	80:14-15	R
26:13 - 26:14	R, 403, ID, LC	82:5-9	82:5-9	R
26:17 - 26:24	R, 403, ID, LC	82:12-14	82:12-14	R
29:9 - 29:18	R, 403	82:17-18	82:17-18	R
32:21 - 33:15	R, 403	88:15-18	88:15-18	R
35:4 - 35:14	R, 403	88:23-89:1	88:23-89:1	R
35:21 - 36:24	R, 403, V	93:12-15	93:12-15	R
38:2 - 38:6	R, 403, V	93:18	93:18	R
39:2 - 39:19	R, 403, V	152:16-20	152:16-20	R
40:2 - 40:4	R, 403, ID, LC, V	220:14-17	220:14-17	R, 403, N, NA, LC
40:7 - 40:24	R, 403, ID, V, CD	222:5-8	220:20-	R, 403, N, NA, LC
	R, 403, ID, V	222:11-15	221:16	
41:1 - 41:9		222:17-18		
41:11 - 41:23	R, 403, ID, V	222:21-223:8	222:5-8	R, 403, N, NA, LC
42:1 - 42:4	R, 403, ID, MIS, V	242:11-243:9	222:11-15	R, 403, NA, LC
43:10 - 43:24	R, 403, ID, V, IH	245:11-22	222:17-18	R, 403, NA, LC
44:2 - 44:2	R, 403, ID	246:1-14	222:21-223:8	R, 403, NA, LC
44:8 - 44:9	R, 403, ID, Priv	247:6-12	242:11-243:9	R, 403, NA
	R, 403, ID, Priv	247:15-17	245:11-22	R, 403, NA, FN
44:13 - 44:15		251:2-3	246:1-14	R, 403, NA, FN, E, B
	R, 403	251:5-6	247:6-12	R, 403, NA, FN, E, B, L
45:7 - 45:12		251:8-252:15	247:15-17	R, 403, NA, FN, E, B, L
49:2 - 49:6	R, 403	255:7-10	251:2-3	R, 403, B, V, L
49:16 - 49:20	R, 403	255:16-24	251:5-6	R, 403, B, V, L
49:21 - 50:17	R, 403, ID, V, IH, FN			

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
50:19 - 50:20	R, 403, ID, FN		251:8-252:15 R, 403, B, V, L, NA
53:24 - 54:4	R, 403		255:7-10
58:21 - 59:19	R, 403, D, BE, H		255:16-24 R, 403, R, NA
63:22 - 64:5	R, 403		
64:6 - 64:15	R, 403		
67:18 - 67:24	R, 403, ID		
68:1 - 68:22	R, 403, ID, D, BE, H, LC, ATTY, V		
68:23 – 69:10	R, 403, ID, LC, FN, MIS, AF		
69:13 – 69:18	R, 403, ID		
70:22 - 70:24	R, 403, ID		
71:5 - 71:10	R, 403, ID		
75:8 – 75S:10	R, 403, ID		
75:14 - 75:16	R, 403, ID		
78:10 - 78:12	R, 403, ID		
78:15 - 78:17	R, 403, ID, FN		
79:10 - 79:14	R, 403, ID, D, BE, H, V		
79:16 - 80:2	R, 403, ID, D, BE, H		
80:7 - 80:7	R, 403, ID		
80:17 - 80:19	R, 403, ID		
80:22 - 81:2	R, 403, ID		
90:18 - 90:21	R, 403, ID		
90:24 - 90:24	R, 403, ID		
100:9 - 100:17	R, 403, D, BE, H		
100:21 - 101:9	R, 403, D, BE, H, ID		
101:15 - 101:15	R, 403, ID		
101:17 - 101:22	R, 403		
101:23 - 101:24	R, 403, ID, Priv		
102:8 - 102:12	R, 403, ID		
102:21 - 102:22	R, 403, ID		
103:4 - 103:4	R, 403, ID		
103:12 - 104:5	R, 403, D, BE, H		
104:6 - 104:14	R, 403, D, BE, H		
104:22 - 104:24	R, 403, ID		
105:1 - 105:24	R, 403, ID, D, BE, H		
106:1 - 106:13	R, 403, ID, D, BE, H		
106:22 - 107:1	R, 403, ID		
107:4 - 107:4	R, 403, ID		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
107:5 - 107:8	R, 403, ID		
107:14 - 107:18	R, 403, ID		
107:20 - 108:14	R, 403, ID, D, BE, H		
108:17 - 108:17	R, 403, ID		
108:18 - 108:20	R, 403, ID		
109:11 - 109:11	R, 403, ID		
110:13 - 110:15	R, 403, ID		
110:20 - 110:20	R, 403, ID		
112:11 - 112:14	R, 403, ID		
112:17 - 112:24	R, 403, ID		
113:2 - 113:22	R, 403, ID, D, BE, H		
114:9 - 114:13	R, 403, ID, Priv, LC		
114:24 - 115:2	R, 403, ID		
115:4 - 115:11	R, 403, ID, Priv, LC		
115:20 - 116:2	R, 403, ID		
118:22 - 118:24	R, 403, D, BE, H		
119:1 - 119:15	R, 403, ID, D, BE, H		
120:18 - 120:24	R, 403, ID		
123:5 - 123:7	R, 403, ID, LC		
123:12 - 123:15	R, 403, ID		
123:17 - 124:15	R, 403		
126:21 - 127:11	R, 403		
127:12 - 127:19	R, 403, D, BE, H, ID		
128:6 - 128:11	R, 403		
128:21 - 129:11	R, 403, ID, D, BE, H		
129:17 - 129:17	R, 403, ID		
130:15 - 130:18	R, 403, ID, Priv		
137:12 - 137:17	R, 403, ID		
137:22 - 137:22	R, 403, ID		
138:19 - 138:24	R, 403, ID		
139:3 - 139:15	R, 403, ID		
139:18 - 139:24	R, 403, ID		
140:2 - 140:24	R, 403, D, BE, H		
141:1 – 141:2	R, 403, ID, LC, FN		
141:5 – 141:10	R, 403, ID		
142:6 - 142:10	R, 403, ID		
142:15 - 142:15	R, 403, ID		
142:17 - 142:18	R, 403, ID, Priv		
143:1 - 143:6	R, 403, ID		
143:13 - 145:21	R, 403, D, BE, H		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
147:14 - 148:4	R, 403, D, BE, H		
148:8 - 148:11	R, 403		
148:12 - 149:5	R, 403		
150:16 - 150:24	R, 403, ID, D, BE, H		
151:1 - 151:13	R, 403, ATTY, ID, V		
155:8 - 155:14	R, 403, D, BE, H		
155:20 - 156:6	R, 403, D, BE, H		
156:7 - 156:23	R, 403, D, BE, H		
	R, 403, D, BE, H, LC, V, FN		
157:21 - 161:3	R, 403, D, BE, H		
162:2 - 162:7	R, 403		
162:23 - 163:6	R, 403, ID		
163:16 - 163:18	R, 403, ID		
164:11 - 165:9	R, 403, D, BE, H		
167:4 - 167:12	R, 403, D, BE, H		
167:15 - 168:6	R, 403, D, BE, H		
168:7 - 168:13	R, 403		
168:19 - 170:2	R, 403, D, BE, H		
171:14 - 171:19	R, 403, H		
171:22 - 172:1	R, 403, H		
	R, 403, D, BE, H, V, ID		
172:18 - 172:19	R, 403, ID, D, BE, H		
173:1 - 173:17	R, 403, D, BE, H, ID		
174:4 - 174:8	R, 403, ID		
174:13 - 174:14	R, 403, ID		
176:2 - 176:12	R, 403, H		
176:16 - 177:12	R, 403, D, BE, H		
177:18 - 178:4	R, 403, D, BE, H		
	R, 403, D, BE, H, CD, ID		
178:22 - 179:7	R, 403, D, BE, H		
179:21 - 180:2	R, 403, H		
180:5 - 180:7	R, 403, H		
180:10 - 180:16	R, 403, D, BE, H, ID		
180:21 - 180:21	R, 403, D, BE, H, ID		
181:11 - 181:18	R, 403		
183:4 - 183:13	R, 403, H		
	R, 403, D, BE, H, LC, V, ID		
183:17 - 184:1			

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
184:4 - 184:6	R, 403, ID		
184:8 - 184:13	R, 403, H		
185:9 - 185:15	R, 403, ID		
186:8 - 186:9	R, 403, ID		
186:17 - 186:17	R, 403, ID		
187:5 - 187:17	R, 403, H		
187:21 - 188:13	R, 403, D, BE, H		
188:14 - 188:23	R, 403, H		
	R, 403, D, BE, H, ID, FN, V		
189:3 - 189:19			
189:21 - 190:21	R, 403, ID, D, BE, H		
214:3 - 214:12	R, 403, ID		
214:18 - 215:14	R, 403, ID		
214:18 - 215:14	R, 403, ID		
216:4 - 216:11	R, 403		
217:8 - 219:21	R, 403		
224:4 - 224:8	R, 403, ID		
224:15 - 224:18	R, 403, ID		
226:20 - 226:24	R, 403, H, ID		
227:1 - 227:7	R, 403, H, ID, Q		
229:6 - 229:13	R, 403, ID		
229:19 - 229:24	R, 403, D, BE, H		
230:23 - 231:1	R, 403, ID		
231:4 - 231:11	R, 403, ID, Priv		
231:12 - 231:24	ATTY, R, 403, ID		
232:1 - 232:24	ID, R, 403, D, BE, H		
233:12 - 233:14	R, 403, ID, Priv		
233:16 - 233:16	R, 403, ID		
235:3 - 235:4	R, 403, ID, Q		
235:10 - 235:24	R, 403, ID, D, BE, H		
	R, 403, ID, Priv, D, BE, H		
236:1 - 236:16			
236:23 - 237:2	R, 403, ID, D, BE, H		
237:4 - 237:19	R, 403		
29:22 – 29:24	R, 403		
40:2-40:4	R, 403, ID, LC, V		
40:7-41:9	R, 403, ID, V		
	R, 403, ID, MIS, ATTY		
41:11-42:5			
42:7 – 42:11	R, 403, ID		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
43:5 – 43:8	R, 403, ID, V		
44:17 - 44:24	R, 403, Priv, ATTY		
47:9 – 47:15	R, 403, Priv, ATTY		
50:21-52:3	R, 403, V, Priv, ATTY		
59:20-60:1	R, 403		
62:14-63:3	R, 403, D, BE, H, ID, AF, FN		
63:5 – 63:9	R, 403, ID, FN		
69:1 - 69:10	R, 403, ID, LC, FN, MIS, AF		
69:13 – 69:18	R, 403, ID		
69:20-70:4	R, 403, D, BE, H		
75:18-76:2	R, 403, ID, D, BE, H, AF, FN		
76:4-76:17	R, 403, ID, D, BE, H, FN, AF		
76:19-76:23	R, 403, ID, FN		
78:19-78:24	R, 403		
83:12-84:1	R, 403, D, BE, H, FN, AF, LC, ID		
84:5-84:9	R, 403		
84:12 – 84:12	R, 403		
86:14-86:18	R, 403, ID, Priv, ATTY		
86:22	R, 403, ID		
89:18-90:3	R, 403, ID		
90:7	R, 403, ID		
91:9-21	R, 403, D, BE, H		
92:5-8	R, 403, ID		
92:11	R, 403, ID		
99:8-10	R, 403		
114:5-7	R, 403, D, BE, H, ID		
122:18-123:1	R, 403, ID		
124:23-126:20	R, 403, Q, D, BE, H		
128:3-4	R, 403, ID, D, BE, H		
131:17-23	R, 403, ID, Priv		
132:17-20	R, 403, ID		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
132:24-133:14	R, 403, ATTY, Priv, ID		
146:7-14	R, 403, D, BE, H		
149:6-150:4	R, 403, D, BE, H		
151:19-23	R, 403		
170:16-171:10	R, 403, D, BE, H		
177:13-17	R, 403, Q		
178:21	R, 403, ID, D, BE, H		
184:20-185:6	R, 403, ID, LC, V, FN		
220:1-13	R, 403		
228:19 – 228:24	R, 403, ID		
229:6 – 229:13	R, 403, ID		
248:4-22	R, 403, D, BE, H, ID		
248:24	R, 403, ID		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
9:14 - 9:15		26:2-4	26:2-4
14:1 – 14:16		26:6-9	26:6-9
15:1 – 15:14		57:13-58:3	57:13-58:3
15:23 – 16:8	403, V, R, CD	65:22-25	65:22-25
16:10 – 16:11	403, V, R	66:2-4	66:2-4
16:13 – 16:23	403, V, R	75:22-23	75:22-23 R
17:2 – 17:8	403, V, R	75:25-76:9	75:25-76:9 R
17:18 – 18:2	403, V, R	87:4-7	87:4-7
19:3 – 19:8	403, S, FN	95:17-19	95:17-19
19:17 – 19:22	403, V, S	95:21-25	95:21-25 N, R
21:3 - 21:6	403, V	103:4-5	103:4-5 ID, N, R
21:8 - 21:8	403, V	103:7-10	103:7-10 ID, N, R
21:14 – 21:18	403, V	119:18-20	119:18-20 IO, R
21:20 – 22:2	403, V	119:22-25	119:22-25 IO, R
23:9 – 23:24	403, V, S, IH, MIS	126:24-25	126:24-25 ID, R
24:1 – 25:3	403, V, S, IH, MIS	127:1-3	127:1-3 ID, R
25:5 – 25:6	403, V, S, IH, MIS	127:5-12	127:5-12 ID, R
25:8 – 25:8	403, V, S, IH, MIS	127:14-17	127:14-17 ID, R
	403, V, S, IH, MIS,	127:19-23	127:19-23 ID, R
25:10 – 26:1	MIL	127:25-128:2	
	403, V, S, IH, MIS,	128:4-12	127:25-128:2 ID, R
26:11 – 27:15	MIL	128:14-16	
	403, V, S, IH, MIS,	128:18-20	128:4-12 ID, R
27:17 – 28:7	MIL	133:18-19	
	403, V, IH, LC	133:21-134:16	
28:9 – 28:21		134:18-23	128:14-16 ID, R
28:23 – 28:24	403, V, IH, LC	134:25-135:8	128:18-20 ID, R
29:15 – 29:17	403, V, IH, LC	138:24-25	133:18-19 403, IO, R
35:14 – 36:24	403, V, R, S	138:2-6	133:21-134:16 403, IO, R
39:10 - 39:25	D, H, R	140:15-141:4	134:18-23
	403, V, MIS, MIL,	142:13-143:4	
40:5 - 40:18	FN	146:24-25	134:25-135:8 403, R
	403, V, MIS, MIL,	148:16-23	
40:20 - 40:21	FN	154:14-155:16	138:24-25 ID, R
40:23 – 41:7	D, H, R, LC	155:19-156:25	138:2-6 ID, N, R
41:8 - 41:10	D, H, R, LC	157:3-13	140:15-141:4
41:12 - 41:14	D, H, R, LC	158:2-6	142:13-143:4 R
41:22 - 41:25	403, MIS, S, MIL, IH	158:9-159:8	146:24-25 ID, R, 403
42:2 - 42:13	403, MIS, S, MIL, IH	159:11-18	148:16-23 ID, N, R
42:15 - 42:17	403, MIS, S, MIL, IH	160:4-8	154:14-155:16 ID, IO, L, V

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
42:18 - 42:19	403, MIS, S, MIL, IH	160:10-15	155:19-156:25 FN, ID, IO, L, V, N, NA
42:21 - 43:6	403, MIS, S, MIL, IH		157:3-13 FN, ID, IO, L, V, N, NA
43:8 - 43:11	403, MIS, S, MIL, IH		158:2-6 ID, IO, L, LC, NA, S, V
43:13 - 44:4	403, MIS, S, MIL, IH, H		158:9-159:8 ID, IO, L, LC, NA, S, V
44:5 - 44:6	403, MIS, S, MIL, IH, H		159:11-18 ID, IO, L, LC, NA, S, V
44:14 - 44:24	403, MIS, S, MIL, IH, H		160:4-8 ID, IO, L, LC, V
45:1 - 45:14	403, MIS, S, MIL, IH, H		160:10-15 ID, IO, LC, V
45:16 - 45:17	403, MIS, S, MIL, IH, H		
45:18 - 46:1	403, D, MIS		
46:2 - 46:4	403, D, MIS		
46:6 - 46:9	403, D, MIS		
46:10-46:13	403, D, MIS		
46:14 - 46:19	403, D, MIS		
46:20 - 46:21	403, D, MIS		
47:2 - 47:4	403, V, R		
47:6 - 47:6	403, V, R		
47:8 - 47:13	403, D, V, IH		
47:15 - 47:17	403, D, V, IH		
47:19 - 47:22	403, D, V, IH		
48:2 - 48:3	403, D, V, IH		
48:5 - 48:5	403, D, V, IH		
48:7 - 48:10	403, D, V, IH		
48:12 - 48:17	403, D, V, IH, MIS		
48:19 - 48:25	403, D, V, IH, MIS		
49:2 - 49:11	403, D, V, IH, MIS		
49:13 - 49:14	403, D, V, IH, MIS		
49:16 - 49:19	403, D, V, IH, MIS, CD		
49:21 - 49:21	403, D, V, IH, MIS, CD		
49:24 - 50:1	403, MIS, S, ID, CD		
50:5 - 50:6	403, MIS, S, ID, CD		
50:9 - 50:11	403, MIS, MIL, V		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
50:13 - 50:16	403, MIS, MIL, V		
50:18 – 50:20	V, ID		
52:5 - 52:15	403, V, CD, MIS, MIL, H		
52:17 - 52:23	403, V, CD, MIS, MIL, H		
53:24 - 53:25	403, V, CD, H		
54:1 - 54:3	403, V, CD, H		
54:5 - 54:5	403, V, CD, H		
54:11 - 54:14	403, V, MIS, R		
54:16 - 55:1	403, V, MIS, R		
55:2 - 55:22	403, D, H, V, R		
55:23 – 56:11	403, D, H, V, R		
56:13 – 56:13	403, D, H, V, R		
56:15 - 57:7	403, D, H, V, R		
56:15 - 57:7	403, D, H, V, R		
57:8 – 58:9	403, V, R, ID		
58:4 - 58:9	403, D, H, V		
58:11 - 58:12	403, D, H, V		
58:13 – 58:16	403, D, H, V, S		
58:18 – 58:23	403, D, H, V, S		
58:24 - 59:1	403, D, H, V, S		
59:3 - 59:4	403, D, H, V, S		
59:6 - 59:10	403, D, H, V, S		
59:11 – 59:19	403, D, H, V, S		
59:20 - 59:24	403, D, H, V, S		
60:1 - 60:4	403, D, H, V, S		
60:6 – 60:9	403, D, H, V, S		
60:12 – 60:14	403, D, H, V, S		
61:14 – 61:16	403, D, H, V, S		
61:18 – 62:3	403, D, H, V, S		
62:4 - 62:19	403, D, H, V, S, R		
62:21 - 63:2	403, D, H, V, S, R		
63:23 - 64:2	403, MIS, R, MIL, AF		
64:4 - 64:15	403, MIS, R, MIL, AF		
64:22 - 64:25	403, MIS, R, MIL, AF		
65:3 - 65:7	403, MIS, R, MIL, AF		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
65:9 - 65:9	403, MIS, R, MIL, AF		
65:11 - 65:16	403, MIS, R, MIL, AF, S		
65:18 - 65:20	403, MIS, R, MIL, AF, S		
66:6 - 66:7	403, MIS, R, MIL, AF, S		
66:9 - 66:12	403, MIS, R, MIL, AF, S		
66:14 - 66:16	403, MIS, R, MIL, AF, S		
66:18 - 66:22	403, MIS, R, MIL, AF, S		
66:24 - 67:2	403, MIS, R, MIL, AF, S, IH		
67:4 - 67:9	403, MIS, R, MIL, AF, S, IH		
67:11 - 67:14	403, MIS, R, MIL, AF, S, IH		
67:16 - 67:17	403, MIS, R, MIL, AF, S, IH		
67:19 - 67:24	403, MIS, R, MIL, AF, S, IH		
67:25 – 68:9	403, R, V		
68:10 - 68:12	403, R, V		
68:14 - 68:19	403, R, V		
68:21 - 68:25	403, R, V		
69:2 - 69:8	403, R, V		
69:9 – 69:11	403, R, V		
74:16 - 74:18	403, V, CD, S		
74:20 - 75:4	403, V, S		
75:6 - 75:21	403, V, S		
76:10 - 76:17			
79:7 - 79:17	403, D, H		
80:1 – 80:11	403, D, H, V, LC		
80:12 – 80:13	403, D, H, V, LC		
80:15 – 80:19	403, D, H, V, LC		
80:22 – 80:24	403, D, H, V, LC, S		
81:1 – 81:5	403, D, H, V, LC, S		
81:7 – 81:18	403, D, H, V, LC, S		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
81:20 – 81:23	403, D, H, V, LC, S		
82:5 - 82:17	403, D, H, V, LC, S		
82:19 - 83:5	403, D, H, V, LC, S		
83:7 - 83:10	403, D, H, V, LC, S		
83:12 – 83:17	403, D, H, V, LC, S		
83:25 – 84:6	403, D, H, V, LC, S		
84:7 – 84:24	403, D, H, V, LC, S		
85:1 – 85:1	403, D, H, V, LC, S		
86:17 – 87:3	403, R, S, B, V		
90:16 – 91:12	403, D, H, FN		
93:21 – 94:9	403, D, H, FN, MIS, LC		
94:11 – 94:13	403, D, H, FN, MIS, LC		
94:15 – 94:23	403, D, H, V, R, MIS, LC		
94:25 – 94:25	403, D, H, V, R, MIS, LC		
95:2 – 95:12	403, D, H, V, R, MIS, LC		
95:14 – 95:15	403, D, H, V, R, MIS, LC		
96:2 - 96:4	403, V, MIS, IH		
96:6 - 96:20	403, V, MIS, IH		
96:23 – 97:11	403, D, H, CD		
130:5 – 131:1	403, D, H, ID, S		
131:3 - 131:13	403, D, H, ID, S		
131:16 – 131:17	403, D, H, ID, S		
131:20 - 132:18	403, D, H, MIS, R		
132:20 - 132:20	403, D, H, MIS, R		
132:22 - 132:24	403, D, H, MIS, R		
133:1 - 133:1	403, D, H, MIS, R		
136:9 - 137:4	403, D, H, S, MIS		
138:17 - 138:25	403, D, H, S, MIS		
139:1 - 139:18	403, D, H, S, MIS, MIL, IH		
160:20 - 161:4	403, 611, AA, V		
161:5 – 161:16	403, 611, AA, V		
161:17 - 161:19	403, 611, AA, V		
161:21 - 161:21	403, 611, AA, V		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
161:23 - 162:1	403, 611, AA, V, S, MIS		
162:3 - 162:10	403, 611, AA, V, S, MIS		
162:12 - 162:20	403, 611, AA, V, S, MIS		
162:22 - 162:25	403, 611, AA, V, S, MIS		
163:3 - 163:4	403, 611, AA, V, S, MIS		
163:6 – 163:9	403, 611, AA, V, S, MIS, LC		
163:11 – 163:13	403, 611, AA, V, S, MIS, LC		
163:15 - 164:5	403, 611, AA, V, S, MIS		
164:7 - 164:7	403, 611, AA, V, S, MIS		
164:9 - 164:14	403, 611, AA, V, S, MIS		
164:16 - 164:18	403, 611, AA, V, S, MIS		
138:8-16	403, D, H, S, MIS, IH		
137:8-10	403, D, H, S, MIS, IH		
137:12-23	403, D, H, S, MIS, IH		
135:10-136:2	403, D, H, S, MIS		
133:3-17	403, D, H, MIS, R, S		
131:3-9	403, D, H, ID, S		
128:24-129:5	403, D, H, ID		
148:25-149:17	403, D, H, ID, MIL, MIS		
147:7-148:14	403, D, H		
119:14-16	403, D, H, V, S, FN, MIS		
118:20-119:12	403, D, H, V, S, FN, MIS		
116:19-118:5	403, D, H, V, S, FN, MIS		
114:3-5	403, D, H, V, S, FN, MIS		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
113:16-114:1	403, D, H, V, S, FN, MIS			
112:16-113:14	403, D, H, V, S, FN, MIS			
112:10-14	403, D, H, V, S, FN			
110:25-112:8	403, D, H, V, S, FN			
106:12-107:12	403, D, H, V			
103:21-23	403, D, H, MIL, MIS			
103:25-104:1	403, D, H, MIL, MIS			
103:12-15	403, V, MIS, MIL			
103:1-2	403, D, H, MIL, MIS			
102:23-24	403, D, H, MIL, MIS			
102:5-10	403, D, H			
101:18-102:1	403, D, H, R, MIL, MIS			
98:13-101:16	403, D, H, R, MIL, MIS			
98:3-5	403, D, H, R			

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
6:10 - 6:11		27:23-24	27:23-24	N, R
6:12 - 6:14		28:1-2	28:1-2	N, R
6:15 - 6:17		30:21-31:1	30:21-31:1	R
8:1 - 8:3		31:3-18	31:3-18	R
10:2 - 10:13	R, 403	33:19-20	33:19-20	ID, R
10:15 - 10:25	R, 403	33:22-24	33:22-24	ID, R
11:1 - 11:15	R, 403, V	34:6-9	34:6-9	R
12:14 - 13:7	R, 403, S, V	34:11	34:11	R
15:9 - 15:23	R, 403, H	36:7-9	36:7-9	R, 403
18:8 - 19:13	R, 403, S, V	36:11-12	36:11-12	R, 403
20:11 - 20:14	R, 403, V	38:6-11	38:6-11	ID, R
20:19 - 20:25	R, 403, V	38:23-25	38:23-25	R
21:3 - 21:23	R, 403, S, V	39:3-5	39:3-5	R
23:25 - 24:8	R, 403, V	41:13-15	41:13-15	ID
24:14 - 25:2	R, 403, S, V, FN	41:17-42:3	41:17-42:3	ID, R, N, NA
25:4 - 26:13	R, 403, FN, S, V, H	43:3-8	43:3-8	R, ID, 403, NA
26:15 - 27:8	R, 403, FN, MIS, V	43:10-19	43:10-19	R, ID, 403, NA
27:10 - 27:14	R, 403, ID, S	45:21-23	45:21-23	R, N
28:4 - 28:12	R, 403, D, BE, ID, FN, S	45:25-46:1	45:25-46:1	R, N
28:14 - 29:2	R, 403, D, BE, ID, FN, S	51:1-5	51:1-5	R
29:4 - 29:4	R, 403, D, BE, ID, FN, S	55:4-5	55:4-5	R
29:6 - 29:21	R, 403, ID, D, V, BE, H, V	55:7-9	55:7-9	R
29:23 - 30:4	R, 403, ID, S, V, AA, D, BE, IO, FN	55:20-23	55:20-23	R
30:6 - 30:20	R, 403, ID, S, D, BE, H, IO, V, FN	56:2-12	56:2-12	ID, R
31:20 - 31:24	R, 403, ID, MIS, V, AA, IO, FN, E, MIS	61:7-17	61:7-17	R
32:1 - 32:7	R, 403, ID, S, V, IO, FN, E, MIS, E			
32:9 - 33:4	R, 403, ID, S, D, BE, V, IO, FN, MIS, E			
33:6 - 33:9	R, 403, ID, D, BE, V, IO, FN, MIS, E			

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
33:11 - 33:15	R, 403, ID, V, IO, FN, MIS, E		
33:17 - 33:17	R, 403, ID, IO, FN, MIS, E		
35:11 - 35:23	R, 403, ID, D, BE, IO, H, E		
35:25 - 35:25	R, 403, ID, IO, V, E		
36:2 - 36:3	R, 403, ID, IO, V, E		
36:5 - 36:5	R, 403, ID, IO, E		
36:19 - 36:20	R, 403, ID, V, D, BE, IO, MIS, E		
36:22 - 37:1	R, 403, ID, D, BE, IO, E		
38:12 - 38:13	R, 403, ID, D, BE, V, IO, MIS, E		
38:15 - 38:15	R, 403, ID, D, BE, IO, MIS, E		
38:17 - 38:22	R, 403, ID, D, BE, IO, MIS, E		
39:13 - 39:19	R, 403, ID, D, BE, V, H, IO, MIS, E		
39:21 - 39:22	R, 403, ID, D, BE, IO, MIS, E		
40:15 - 40:18	R, 403, ID, IO, AA, IO, MIS, E		
40:20 - 40:21	R, 403, ID, IO, MIS, E		
44:6 - 44:18	R, 403, D, BE, V, H, IO, MIS, E		
44:20 - 45:11	R, 403, ID, D, BE, IO, H, MIS, E		
45:13 - 45:17	R, 403, ID, IO, MIS, E		
45:19 - 45:19	R, 403, ID, IO, MIS, E		
46:3 - 46:7	R, 403, ID, IO, MIS, E		
46:9 - 46:9	R, 403, ID, IO, MIS, E		
47:4 - 47:10	R, 403, D		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
47:18 - 48:3	R, 403, D, BE, H, MIS, IO, ID, E		
48:5 - 48:13	R, 403, ID, IO, MIS, E		
48:15 - 48:17	R, 403, ID, IO, S, MIS, E		
48:19 - 48:19	R, 403, IO, FN, V, MIS, E		
48:21 - 49:12	R, 403, ID, IO, S, V, MIS, E		
49:14 - 49:23	R, 403, ID, IO, S, V, MIS, E		
50:1 - 50:2	R, 403, ID, V		
50:4 - 50:4	R, 403, ID		
50:12 - 50:25	R, 403, S, IO, V, MIS, E		
53:6 - 53:17	R, 403, D, BE, H, AF, E, FN, ID, IO, MIS, Q		
53:18 - 53:21	R, 403, D, BE, H, AF, E, FN, ID, IO, MIS, Q		
60:1 - 60:10	R, 403, D, BE, H, AF, E, FN, ID, IO, MIS, Q		
60:11 - 60:22	R, 403, D, BE, H, AF, E, FN, ID, IO, MIS, Q		
62:7 - 62:19	R, 403, D, BE, H, AF, E, FN, ID, IO, MIS, Q		
62:25 - 63:2	R, 403, D, BE, H, AF, E, FN, ID, IO, MIS, Q		

EXHIBIT 9**XXI. Aaron Waxman (December 12, 2024)**

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations	
6:10 - 7:1	403, V, MIS, R, E	12:10-20	12:10-20	ID
9:16 - 9:25	D, H, MIS	46:3-5	46:3-5	R, H
10:13 - 10:17	D, H	60:25-61:3	60:25-61:3	ID, R, H
10:18 - 10:23	D, H	61:11-62:13	61:11-62:13	ID, R, H
12:10 – 12:20	403, V, S, FN	84:20-25	84:20-25	ID, H, R
13:14 - 14:12	D, H, MIS, V	85:4-16	85:4-16	H, R
14:23 - 15:2	403, CD, V	92:8-13	92:8-13	H, R
15:4 - 15:4	D, H, 403, CD, V	92:16-24	92:16-24	H, R
15:24 - 16:17	D, H, 403, CD, V	93:1-3	93:1-3	H, R
16:21 - 17:8	D, H, 403, CD, V	98:13-17	98:13-17	H, R
17:10 - 18:1	D, H, 403, CD, V	100:7-16	100:7-16	H, R
18:11 - 19:8	D, H, 403, V	107:13	107:13	ID
19:17 - 19:19	D, H, 403, V	107:16-21	107:16-21	R
19:24 - 20:5	D, H, 403, V	107:23-108:2	107:23-108:2	R
20:11 - 20:16	D, H	108:5-10	108:5-10	R
22:23 - 23:25	D, H, MIS, 403	109:17-25	109:17-25	R
24:2 - 25:2	D, H, MIS, S, 403	110:3-11	110:3-11	R
25:4 - 25:6	D, H, MIS, S, 403	132:15	132:15	ID
25:16 - 25:16	403, V	133:25-134:5	133:25-134:5	R
25:18 - 26:8	403, V, LC	134:15-24	134:15-24	R
26:10 - 26:17	403, V, LC	138:5-9	138:5-9	ID, R
26:19 - 26:19	D, H, 403, V	138:11-20	138:11-20	ID, R
26:20 - 27:10	D, H, 403, V	138:22-139:2	138:22-139:2	ID, R
27:12 - 27:15	D, H, 403, V	139:5	139:5	ID, R
30:10 – 30:12	D, H, 403, V	143:11-22	143:11-22	ID
30:13 - 31:5	D, H, 403, V, S	144:16-22	144:16-22	ID
31:7 - 31:11	D, H, 403, V, S	155:15-19	155:15-19	ID, R
31:13 - 31:16	D, H, 403, V, S	155:21-156:17	155:21-156:17	ID, R
31:17 - 32:12	D, H, 403, V, S	158:3-5	158:3-5	ID, N, 403, R
32:14 - 32:19	D, H, 403, V, S	158:7-17	158:7-17	ID, N, 403, R
32:22 - 32:23	D, H, 403, V, S	158:19-159:4	158:19-159:4	ID, N, 403, R
34:8 - 34:9	403, V, S, MIS	161:25-163:4	161:25-163:4	H, R
34:13 - 34:19	403, V, S, MIS	163:7-8	163:7-8	H, R
34:23 - 34:23	403, V, S, MIS	163:10-164:1	163:10-164:1	H, R
35:15 - 36:16	D, H, MIS, S	172:2-173:5	172:2-173:5	H, R
36:25 - 37:9	D, H, MIS, S	176:20-22	176:20-22	H, R
37:12 - 37:22	D, H	176:24-177:6	176:24-177:6	H, R
38:2 - 38:14	D, H, MIS, S	178:5-9	178:5-9	H, R
38:17 - 38:20	MIS, IO	178:11-12	178:11-12	H, R

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
38:22 - 38:25	MIS, S	181:4-7	181:1-2 H, R
39:2 - 39:3	MIS, S	182:11-19	181:4-7 H, R
40:16 - 40:24	D, H	186:11-18	182:11-19 H, R
41:1 - 41:12	D, H, R	186:20-22	186:11-18 ID
41:15 - 42:3	D, H, ATTY, R	194:5-11	186:20-22 ID
42:6 - 42:6	D, H, R	198:3-5	194:5-11 H, R
42:10 - 42:14	D, H, R, IO	198:7-13	198:3-5 H, R
42:17 - 43:2	D, H, R, IO	198:15	198:7-13 H, R
43:5 - 43:13	D, H, R, IO	199:22-25	198:15 H, R
43:16 - 43:18	D, H, R, IO	200:2-5	199:22-25 H, R
43:20 - 43:20	D, H, R, IO	211:1	200:2-5 H, R
45:12 - 45:16	D, H, MIS	211:4-10	211:1 H, R
46:6 - 46:21	D, H, LC, ATTY	223:17-224:11	211:4-10 H, R
46:23 - 46:24	403, V, ID	226:18-23	223:17-224:11 ID
	403, V, S	227:4-6	226:18-23 AA, H, S, IO, R
47:1 - 47:7		227:22-228:4	227:4-6 AA, H, S, IO, R
47:9 - 47:18	403, V, S, LC	228:7-24	227:22-228:4 H, IO, R
47:20 - 47:22	403, V, S, LC	229:2-12	228:7-24 H, IO, R
47:23 - 48:4	403, V, S, LC	229:15-18	229:2-12 H, IO, R
48:6 - 48:15	V, R, IO		229:15-18 H, IO, R
49:22 - 50:3	D, H, MIS		
50:5 - 50:6	D, H, MIS, IO		
50:6 - 50:9	D, H, MIS, IO		
50:12 - 50:23	V, IO		
51:1 - 51:10	V, IO		
52:8 - 52:10	V, IO		
52:13- 52:16	V, IO		
52:23 - 53:2	D, H, MIS		
53:3 - 53:7	D, H, MIS		
53:9 - 53:22	D, H, MIS		
53:24 - 54:9	D, H, MIS		
54:10 - 54:13	D, H, MIS		
54:15 - 55:3	D, H, MIS		
55:5 - 55:13	D, H, MIS		
56:23 - 57:7	D, H, MIS		
57:9 - 57:9	D, H, MIS		
57:10 - 57:18	D, H, MIS		
57:19 - 57:21	D, H, MIS		
57:23 - 57:23	D, H, MIS		
57:24 - 58:9	D, H		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
58:11 - 58:17	D, H		
58:18 - 59:21	D, H		
59:22 - 60:7	D, H		
60:9 - 60:12	D, H		
62:18 - 64:20	D, H		
67:3 - 67:13	D, H, MIS, MIL, R		
67:15 – 68:1	D, H, MIS, MIL, R		
68:3 - 68:10	D, H, MIS, MIL, R		
68:18 - 69:14	D, H, MIS		
69:25 - 70:13	D, H, MIS		
70:14 - 71:6	D, H, MIS		
71:25 – 72:1	D, H, MIS, IO		
72:4 – 72:9	D, H, MIS, IO		
73:1 - 73:6	D, H, MIS, IO		
73:9 - 73:23	D, H, MIS, IO		
74:1 - 74:4	D, H, MIS, IO		
74:6 - 74:12	D, H, MIS, IO		
74:15 - 74:19	D, H, MIS, IO		
75:2 - 75:5	D, H, MIS, IO		
75:7 - 75:10	D, H, MIS, IO		
75:12 - 75:12	D, H, MIS, IO		
75:13 - 75:16	D, H, MIS, IO		
75:19 - 75:20	D, H, MIS, IO		
75:21 - 76:1	D, H, MIS, IO		
76:3 - 76:13	D, H, MIS, IO		
76:16 - 76:25	D, H, MIS, IO		
77:1 - 77:4	D, H, MIS, IO		
77:7 - 77:13	D, H, MIS, IO		
77:16 - 77:17	D, H, MIS, IO		
77:25 - 78:4	V, R		
78:22 - 78:24	V, IO		
79:2 - 79:8	V, IO		
80:6 - 80:17	D, H, IO		
80:20 - 81:25	D, H, IO		
82:1 - 82:2	D, H, IO		
82:4 - 83:5	D, H		
83:5 – 83:10	D, H		
83:11 - 84:11	D, H		
84:13 - 84:19	D, H		
85:1 - 85:3	D, H		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
86:22 - 87:2	D, H, MIS		
87:4 - 87:7	D, H, MIS		
87:8 - 87:12	D, H, MIS		
87:15 – 87:19	D, H, IO, LC		
87:23 – 88:2	D, H, IO, LC		
88:5 - 89:1	D, H, IO, ATTY		
89:3 - 89:3	D, H, IO		
90:4 – 90:17	D, H		
90:19 - 90:19	D, H		
90:20 - 91:5	D, H		
91:6 - 91:20	D, H, IO		
91:23 - 92:1	D, H, IO		
93:4 - 93:12	D, H		
93:14 - 93:14	D, H		
93:15 - 95:6	D, H		
95:8 - 95:14	D, H		
95:16 - 95:16	D, H		
95:17 - 96:4	D, H		
96:7 - 96:11	D, H		
96:16-97:4	D, H		
97:6 - 97:6	D, H		
97:7 - 97:19	D, H		
97:20 - 97:25	D, H		
98:2 - 98:2	D, H		
98:18 - 98:21	D, H		
98:22 – 99:13	D, H		
99:15 - 99:15	D, H		
100:17 - 100:21	D, H		
100:25 - 101:3	D, H		
101:4 - 101:6	D, H		
101:8 - 101:9	D, H		
102:17 – 102:23	D, H		
103:2 - 103:4	D, H, IO		
103:7 - 103:10	D, H, IO		
103:12 - 103:12	D, H, IO		
103:13 - 103:16	D, H, IO		
103:22 - 104:2	D, H, IO		
104:4 - 104:7	D, H, IO		
104:10 - 104:12	D, H, IO		
104:15 - 104:19	D, H, IO		

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Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
104:21 - 104:21	D, H, IO		
106:6 – 107:12	IO, MIL, V, ATTY, ID		
109:4 - 109:9	D, H		
109:13 - 109:16	D, H, IO		
110:22 - 111:13	D, H, IO		
111:15 - 111:18	D, H, IO		
111:21 - 111:24	D, H, IO		
111:25 - 112:3	D, H, IO		
112:6 – 113:10	D, H, IO		
113:11-113:22	D, H, IO		
113:25-114:1	D, H, IO		
114:3 – 114:9	D, H, IO		
115:15 – 115:18	D, H, IO		
115:21 – 115:25	D, H, IO		
116:1 – 116:18	D, H, IO		
117:1 - 117:9	D, H, IO		
117:10 - 117:15	D, H, IO		
118:5 - 118:17	D, H		
118:18 – 119:10	D, H		
119:11 - 119:15	D, H		
119:16 - 120:17	D, H		
120:19 - 120:23	D, H		
120:24 - 120:25	D, H		
121:13 - 121:15	D, H		
121:17 - 121:17	D, H		
122:20 - 122:23	D, H		
123:20 - 123:23	D, H		
123:24 - 124:3	D, H		
124:14 - 124:21	D, H		
124:23 - 124:23	D, H		
125:7 - 125:17	D, H		
125:23 - 126:1	D, H, LC		
126:3 - 126:18	D, H, LC		
126:19 - 127:16	D, H		
127:17 - 127:24	D, H, S		
128:4 - 128:12	MIS, S, V		
128:19 - 128:24	MIS, V, LC		
129:1 - 129:9	MIS, V, LC		
129:13 - 129:19	D, H		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
130:2 - 130:5	D, H, IO		
130:8 - 130:9	D, H, IO		
130:10 - 131:3	D, H		
131:5 - 131:14	D, H		
131:15 - 132:9	D, H, 403, V		
132:11 - 132:12	403, V, S		
132:14 - 132:14	403, V, S		
132:17 - 132:20	403, V,		
132:21 - 132:25	403, V		
133:2 - 133:10	403, V		
139:6 - 139:11	D, H, FN		
142:15 - 143:22	D, H		
143:24 - 144:5	403, V, S		
144:7 - 144:15	403, V, S		
151:21 - 152:21	D, H, V		
153:4 - 153:6	D, H, V		
153:8 - 153:21	D, H, V		
154:15 - 155:8	D, H, V, MIL		
155:12 - 155:14	D, H, V, MIL		
157:16 - 157:22	D, H		
159:14 - 160:2	D, H, 403		
161:5 - 161:16	D, H		
164:2 - 164:9	D, H		
164:10 - 165:6	D, H, LC		
165:9 - 165:12	D, H, LC		
165:20 - 166:1	D, H, 403		
166:3 - 167:5	D, H, 403		
167:7 - 167:15	D, H, 403		
167:20 - 168:4	D, H, 403		
168:2 - 168:4	D, H, 403		
168:6 - 168:19	D, H, 403		
168:20 - 169:14	D, H, 403		
170:4 - 171:16	D, H, 403		
171:20 - 171:22	V, S		
171:24 - 172:1	403, V, H		
173:14 - 174:2	403, V, H		
174:13 - 174:19	403, V, R		
174:21 - 174:23	D, H		
176:10 - 176:19	D, H		
180:3 - 180:4	D, H		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
180:6 - 180:6	D, H, MIS, S		
180:11 - 180:25	D, H, MIS, S		
181:8 - 181:12	D, H, MIS, S		
183:5 - 183:23	D, H, MIS, S		
183:24 - 184:17	D, H, MIS, S		
184:18 - 185:2	D, H, MIS, S		
185:4 - 185:22	D, H, MIS, S		
186:6 – 186:10	D, H, ID		
188:6 - 188:23	V, S, R		
188:17 - 188:23	V, S, R		
188:25 - 188:25	V, S, R		
190:12 - 190:25	D, H, I		
191:3 - 191:8	D, H, I		
191:10 - 192:2	D, H, I		
192:4 - 192:5	D, H, LC		
192:8 - 192:10	D, H, LC		
192:12 - 192:13	D, H, LC		
192:22 - 194:4	D, H, 403		
194:12 - 194:15	D, H, 403		
194:17 - 195:2	D, H, 403		
195:4 - 195:19	D, H, 403		
195:20 - 196:21	D, H, 403		
197:5 - 197:13	D, H, 403		
197:15 - 198:2	D, H, 403		
200:11 - 200:20	D, H, 403		
200:22 - 201:11	D, H, 403		
201:12 - 201:15	D, H, 403		
201:16 - 202:6	D, H, 403		
202:8 - 202:12	D, H, 403		
202:14 - 202:18	D, H, 403		
202:19 - 202:21	D, H, 403		
202:23 - 203:8	D, H, 403, S		
203:12 - 203:13	D, H, 403, S		
203:16 - 203:18	403, R, MIS		
204:13 - 205:9	MIS, V, 403		
205:11 – 205:25	MIS, V, 403		
207:14 - 208:3	MIS, V, 403		
208:4 - 208:19	MIS, V, 403		
208:22 - 208:22	403, V, IO		
208:23 – 209:3	403, V, IO		

EXHIBIT 9

Liquidia's Designations	UTC's Objections to Liquidia's Designations	UTC's Counter-Designations	Liquidia's Objections to UTC's Counter-Designations
209:6 – 209:10	403, V, IO		
209:13 – 209:13	403, V, IO		
209:14 - 210:13	D, H		
210:14 - 210:16	D, H, IO		
210:19 - 210:19	D, H, IO		
210:20 - 210:25	D, H, IO		
211:11 - 211:11	V, AA, MIS		
211:13 - 211:20	V, AA, MIS		
211:22 - 211:24	V, AA, MIS		
214:8 - 214:18	403, V, R		
214:20 - 215:2	403, V, R		
218:5 - 218:22	B, R, 403, V		
218:23 - 219:1	403, R, S, V		
223:17 - 224:11	MIS, V, 403, S		
224:16 – 224:25	403, S, AA, IO		
225:1 – 225:8	403, S, AA, IO		
225:13 – 225:17	403, S, AA, IO		
225:21 – 225:23	403, S, AA, IO		
225:24 - 226:17	403, S, AA, IO		
229:23 - 230:2	MIS, S, IO, 611		
230:4 - 230:12	MIS, S, IO, 611		
230:16 - 230:22	MIS, S, IO, 611		
230:24 - 231:4	MIS, S, IO, 611		
231:6 - 231:6	MIS, S, IO, 611		

EXHIBIT 10

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0001	2024-12-02 UTC NOD of Jason Adair			R
PTX-0002	Jason Adair LinkedIn Profile/CV			R, H, FN
PTX-0003	2024-03-13 Liquidia Press Release	LIQ_PH-ILD_00001158	LIQ_PH-ILD_00001161	R, H
PTX-0004	2024-10-24 Liquidia's Objections to UTC's 30(b)(6) NOD			R
PTX-0005	2023-05-04 Liquidia Press Release	LIQ_PH-ILD_00143635	LIQ_PH-ILD_00143639	R, H
PTX-0006	2024-01-10 Liquidia Q1 2024 Earnings Call Transcript	LIQ_PH-ILD_00133278	LIQ_PH-ILD_00133290	H, R, 403, A, FN
PTX-0007	2022-01-13 Email from Jeffs to Adair re MNKD 10-K & Call	LIQ_PH-ILD_00113336	LIQ_PH-ILD_00113338	403, FN, H, R
PTX-0008	2022-11-30 Liquidia Steering Committee Meeting	LIQ_PH-ILD_00120036	LIQ_PH-ILD_00120051	H, R, A, FN, 403
PTX-0009	Liquidia Corporate Overview, September 2022	LIQ_PH-ILD_00116386	LIQ_PH-ILD_00116436	403, FN, R, OT
PTX-0010	Liquidia Company Overview, March 2023	LIQ_PH-ILD_00113415	LIQ_PH-ILD_00113421	403, FN, R, OT
PTX-0011	Spreadsheet: Forecast Scenario Comparisons - 05.03.2024	LIQ_PH-ILD_00147313	LIQ_PH-ILD_00147313	403, FN, R, OT
PTX-0012	2023-08-02 Liquidia Board of Directors Meeting	LIQ_PH-ILD_00130620	LIQ_PH-ILD_00130645	403, FN, H, R, A, OT
PTX-0013	2023-05-04 Liquidia FQ1 2023 Earnings Call Transcripts			H, R, 403, A, FN
PTX-0014	2023-10-19 Zinc Update	UTC_PH-ILD_214649	UTC_PH-ILD_214734	403, FN, H, R, A, OT
PTX-0015	Tyvaso DPI Contracting Strategy	UTC_PH-ILD_214635	UTC_PH-ILD_214638	403, FN, H, R, A
PTX-0016	Revenue Package Q2 2024	UTC_PH-ILD_214785	UTC_PH-ILD_214807	403, FN, H, R, A, OT
PTX-0017	Spreadsheet: Yutrepla Competitive Model, 7.28.24	UTC_PH-ILD_214646	UTC_PH-ILD_214646	R, 403, H, INC
PTX-0018	Spreadsheet: March 2024 Commercial and Medicare Update	UTC_PH-ILD_214634	UTC_PH-ILD_214634	R, 403, H, INC
PTX-0019	Spreadsheet: Rebate Model, 4.25.24	UTC_PH-ILD_214648	UTC_PH-ILD_214648	R, 403, H, INC
PTX-0020	2024-11-05 UTC Counsel to Liquidia Counsel re designating Bottorff as corporate counsel for Topics 9-11			403, FN, R, OT, H
PTX-0021	Greg Bottorff LinkedIn Profile/CV			R, H, FN
PTX-0022	2022-02-03 UTC President & COO Report - Board of Directors Meeting	UTC_PH-ILD_214593	UTC_PH-ILD_214602	403, FN, R, OT, H
PTX-0023	Spreadsheet: Budget Allocation 2021	UTC_PH-ILD_218601	UTC_PH-ILD_218601	403, FN, R, A, H
PTX-0024	Co-Pay Support flyer for Remodulin, TYVASO, and Orenitram	UTC_LIQ00077947	UTC_LIQ00077948	403, FN, R, A, H
PTX-0025	Sales Force Working Model	UTC_LIQ00077892	UTC_LIQ00077892	403, FN, R, OT, H, A
PTX-0026	UTC Marketing: Marketing Brand Plans 2021	UTC_PH-ILD_009233	UTC_PH-ILD_009373	403, FN, R, H
PTX-0027	UTC Marketing: Treprostinil Marketing 2022 Business Plan	UTC_PH-ILD_009101	UTC_PH-ILD_009200	403, FN, R, OT
PTX-0028	Powerpoint: Brand Metrics Dashboard	UTC_PH-ILD_218595	UTC_PH-ILD_218595	403, FN, R, OT
PTX-0029	UTC Marketing: 2022 Business Planning	UTC_PH-ILD_009201	UTC_PH-ILD_009232	403, FN, R, H
PTX-0030	Dean Bunce LinkedIn Profile			R, H, FN, OT, BE
PTX-0031	2024-10-09 Liquidia 30(b)(6) NOD to UTC			R
PTX-0032	Intentionally Left Blank			
PTX-0033	Intentionally Left Blank			
PTX-0034	Nathan 2021 Lancet	LIQ_PH-ILD_00000216	LIQ_PH-ILD_00000225	R, H
PTX-0035	Tyvaso Label	UTC_PH-ILD_005268	UTC_PH-ILD_005283	403, H, R
PTX-0036	2020-11-19 IND 134582 Meeting Request - Written Responses	UTC_PH-ILD_114723	UTC_PH-ILD_114735	H, R
PTX-0037	2017-10-03 Email from Palmer to Bunce re Clinical Development Leadership slides	UTC_LIQ00202686	UTC_LIQ00202716	403, FN, H, R
PTX-0038	2017-09-29 Email from Hobbs to Bunce re Response to OOPD for ILD-PH request	UTC_LIQ00177872	UTC_LIQ00177877	403, FN, H, R
PTX-0039	Type B Meeting Package for Tyvaso (March 20, 2020)	UTC_PH-ILD_013520	UTC_PH-ILD_013534	H, R
PTX-0040	Noah Byrd LinkedIn Profile/CV			R, H, FN
PTX-0041	2023 Tyvaso DPI Label	UTC_PH-ILD_005244	UTC_PH-ILD_005260	
PTX-0042	Original INCREASE Protocol (Oct. 21, 2015)	UTC_PH-ILD_054882	UTC_PH-ILD_054950	
PTX-0043	INCREASE Clinical Study Report (May 5, 2020)	UTC_PH-ILD_010356	UTC_PH-ILD_010467	
PTX-0044	Intentionally Left Blank			
PTX-0045	Investigator Brochure for Tyvaso DPI (July 18, 2022)	UTC_PH-ILD_024398	UTC_PH-ILD_024474	
PTX-0046	2025-03-13 UTC's NOD of Richard Channick			
PTX-0047	2024-04-01 [054] [SEALED] Expert Declaration of Dr Richard Channick			
PTX-0048	Letters to the Editor			
PTX-0049	2024-12-20 Expert Report of Dr. Richard Channick			H, R, OT
PTX-0050	2025-01-23 Rebuttal Expert Report of Dr. Richard Channick			H, R, OT
PTX-0051	Hooper 2009			
PTX-0052	2025-02-21 Reply Expert Report of Dr. Richard Channick			H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0053	Channick 2012			
PTX-0054	Youtube: Episode 71 - Richard N. Channick, MD (Transcript)			
PTX-0055	Title 35 - Patents			
PTX-0056	Pulmonary hypertension in chronic lung disease and hypoxia (Nathan 2019)			
PTX-0057	ESC-ERS Guidelines for Diagnosis			
PTX-0058	2024-10-21 [155] Claim Construction Order			
PTX-0059	2022-01-02 Aaron Waxman Deposition Transcript (IPR2021-00406)	LIQ_PH-ILD_00000579	LIQ_PH-ILD_00000595	
PTX-0060	2021-11-12 Rebuttal Expert Report of Dr. Nicholas Hill (20-cv-755)			H, R
PTX-0061	LeVarge 2015			
PTX-0062	Youtube: Managing Pulmonary Arterial Hypertension: Therapeutic Selection and Care Coordination (Transcript)			
PTX-0063	Waxman 2021 - Supplementary Appendix			
PTX-0064	Intentionally Left Blank			
PTX-0065	Intentionally Left Blank			
PTX-0066	Intentionally Left Blank			
PTX-0067	Barst 2012			
PTX-0068	2018-08-07 Bellerophon Therapeutics Press Release			
PTX-0069	Amended Proposed Yutrepla Label (Rev. Jan. 2024)	LIQ_PH-ILD_00000896	LIQ_PH-ILD_00000910	403, R
PTX-0070	Kiernan DeAngelis LinkedIn Profile			H, R
PTX-0071	Kiernan DeAngelis LinkedIn Profile - Experience			H, R
PTX-0072	Intentionally Left Blank			
PTX-0073	2024-11-11 Liquidia NOD of Chunqin Deng			H, R
PTX-0074	CQ Deng CV			BE, OT, R, H
PTX-0075	2015-11-12 Email from Pressley to Laliberte et al re List of Ongoing Studies and the Requirement for SDTM-ADaM mapping	UTC_WAT_00566477	UTC_WAT_00566481	H, R
PTX-0076	RIN-PH-201/202 Data Monitoring Committee Charter (Feb. 18, 2016)	UTC_PH-ILD_072619	UTC_PH-ILD_072631	H, R
PTX-0077	2017-03-01 INCREASE On-site Evaluation Visit	UTC_PH-ILD_077582	UTC_PH-ILD_077620	H, R
PTX-0078	2016-02-18 Email from Leedom to DeAngelis et al re RIN-PH-201/202: Kick-Off Meeting Slides	UTC_LIQ00209441	UTC_LIQ00209441	H, R
PTX-0079	RIN-PH-201/202: Kick-Off Meeting Slides	UTC_LIQ00209442	UTC_LIQ00209472	H, R
PTX-0080	Obstructive and Restrictive Lung Pathology - DeAngelis	UTC_LIQ00209474	UTC_LIQ00209489	H, R
PTX-0081	2015-11-20 RIN-PH-201 Medical Review of Inclusion and Exclusion Criteria based on Amendment	UTC_LIQ00209490	UTC_LIQ00209522	H
PTX-0082	5.18.28 INCREASE 2018 ATS presentation	UTC_PH-ILD_094804	UTC_PH-ILD_094804	H, R
PTX-0083	2020-05-05 Email from Liu to Medical Affairs et al re Tyvaso Research, Pulmonary Fibrosis Facts and Pipeline	UTC_PH-ILD_144560	UTC_PH-ILD_144561	H, R
PTX-0084	2017-03-31 Statistical Analysis Plan for DMC Meeting Deliverables RIN-PH-201/202	UTC_PH-ILD_121512	UTC_PH-ILD_121524	H, R
PTX-0085	2019-02-27 Statistical Analysis Plan RIN-PH-201	UTC_PH-ILD_200239	UTC_PH-ILD_200277	H, R
PTX-0086	2019-05-15 Statistical Analysis Plan RIN-PH-202	UTC_PH-ILD_200278	UTC_PH-ILD_200298	H, R
PTX-0087	2019-12-12 Statistical Analysis Plan Amendment 1 RIN-PH-201	UTC_PH-ILD_179868	UTC_PH-ILD_179908	H, R
PTX-0088	2019-03-22 Email from Kusy to Rollins et al re Walk data report for Site 25 RIN-PH-201	UTC_PH-ILD_140772	UTC_PH-ILD_140773	H, R
PTX-0089	Spreadsheet: Walk Distance for INCREASE 201 (Site 025)	UTC_PH-ILD_140774	UTC_PH-ILD_140774	H, R
PTX-0090	2020-05-26 Email from Increase Study to Increase Study et al re INCREASE Study Webcast #1	UTC_PH-ILD_148525	UTC_PH-ILD_148527	H, R
PTX-0091	2024-07-26 Document Subpoena to Mariana Faria-Urbina			H, R
PTX-0092	Mariana Faria-Urbina, MD LinkedIn Profile/CV			BE, OT, R, H
PTX-0093	2024-12-19 Expert Report of Dr. Nicholas Hill			H
PTX-0094	2025-02-20 Reply Expert Report of Dr. Nicholas Hill			H
PTX-0095	Intentionally Left Blank			
PTX-0096	2015-11-25 Email from Jeffs to Rothblatt re Trip Report on Meeting with Vic Tapson at CSMC	UTC_WAT00628950	UTC_WAT00628951	H, R
PTX-0097	Newman 2017			

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0098	Preston 2020			
PTX-0099	WO 2015/138423	UTC_PH-ILD_219746	UTC_PH-ILD_219853	
PTX-0100	WO 2008/098196	UTC_PH-ILD_219604	UTC_PH-ILD_219631	
PTX-0101	2015-01-09 Email from Lim to Golden re Who Group 3 Tyvaso	UTC_WAT00626981	UTC_WAT00626983	H, R, BRPL
PTX-0102	2024-04-04 UTC's NOD of Douglas Kidder			H, R
PTX-0103	2024-04-01 [055] [SEALED] Declaration of Douglas Kidder			H, R
PTX-0104	2024-01-10 JP Morgan Deck	UTC_PH-ILD_009374	UTC_PH-ILD_009393	H, R
PTX-0105	Exhibit 4.1 - 4.3	LIQ_PH-ILD_00003012	LIQ_PH-ILD_00003014	H
PTX-0106	2023-09-25 Liquidia Press Release	UTC_PH-ILD_003152	UTC_PH-ILD_003153	H, R
PTX-0107	2024-01-10 Liquidia - JP Morgan Presentation Final Transcript	UTC_PH-ILD_009394	UTC_PH-ILD_009407	H, R
PTX-0108	Lieberman & Montgomery 1988	UTC_PH-ILD_002310	UTC_PH-ILD_002328	
PTX-0109	2025-03-13 UTC's NOD of Douglas Kidder			H, R, BRPL
PTX-0110	2025-02-21 Expert Report of Douglas Kidder			H
PTX-0111	Tyvaso DPI Label (Rev. May 2022)	UTC_PH-ILD_010709	UTC_PH-ILD_010725	BE, OT, H
PTX-0112	Kevin Laliberte LinkedIn Profile			BE, OT, R, H, 403
PTX-0113	Intentionally Left Blank			
PTX-0114	Intentionally Left Blank			
PTX-0115	Tyvaso WHO Group 3 Pulmonary Hypertension	UTC_PH-ILD_082768	UTC_PH-ILD_082791	H
PTX-0116	Foley Biography - Stephen B. Maebius			H, R
PTX-0117	IDS submitted May 12, 2021 (327 Patent)	UTC_PH-ILD_009537	UTC_PH-ILD_009547	H, R
PTX-0118	IDS submitted Sept. 21, 2021 (327 Patent)	UTC_PH-ILD_009555	UTC_PH-ILD_009558	H, R
PTX-0119	IDS submitted Feb. 16, 2022 (327 Patent)	UTC_PH-ILD_009616	UTC_PH-ILD_009642	H, R
PTX-0120	IDS submitted May 12, 2021 (327 Patent) (Examiner signed Feb. 27, 2023)	UTC_PH-ILD_009713	UTC_PH-ILD_009735	H, R
PTX-0121	2022-08-31 [433] Trial Opinion (20-cv-755)	LIQ_PH-ILD_00101391	LIQ_PH-ILD_00101445	H
PTX-0122	2022-07-19 [078] Final Written Decision (IPR2021-00406)	LIQ_PH-ILD_00101469	LIQ_PH-ILD_00101517	H
PTX-0123	2021-08-11 [018] Institution Decision (IPR2021-00406)	LIQ_PH-ILD_00101347	LIQ_PH-ILD_00101390	H
PTX-0124	2021-11-10 [029] Patent Owner Response (IPR2021-00406)	LIQ_PH-ILD_00000110	LIQ_PH-ILD_00000184	H
PTX-0125	Provisional Application No. 63/011810	UTC_PH-ILD_069472	UTC_PH-ILD_069522	
PTX-0126	Provisional Application No. 63/160611	UTC_PH-ILD_069548	UTC_PH-ILD_069629	
PTX-0127	U.S. Utility Patent Application No. 17/233,061 (327 Patent)	UTC_PH-ILD_009420	UTC_PH-ILD_009498	
PTX-0128	Amendment and Reply under 37 CFR 1.111 submitted May 10, 2023 (327 Patent)	UTC_PH-ILD_009738	UTC_PH-ILD_009746	
PTX-0129	Notice of Allowance dated June 28, 2023 (327 Patent)	UTC_PH-ILD_009749	UTC_PH-ILD_009754	
PTX-0130	Issue Notification dated Nov. 28, 2023 (327 Patent)	UTC_PH-ILD_009770	UTC_PH-ILD_009771	
PTX-0131	2024-10-28 UTC Third Amended Privilege Log			H, R
PTX-0132	Orange Book Patent and Exclusivity for NDA N022387, Treprostinil (Tyvaso) Solution 0.6MG/ML			H, R
PTX-0133	Vijay Nainani Linked Profile/CV			H, R
PTX-0134	Revenue Package Q3 2023	UTC_PH-ILD_214848	UTC_PH-ILD_214866	H, R
PTX-0135	Revenue Package Q4 2023	UTC_PH-ILD_214867	UTC_PH-ILD_214886	H, R
PTX-0136	Revenue Package Q1 2024	UTC_PH-ILD_214764	UTC_PH-ILD_214784	H, R
PTX-0137	2025-03-07 [039] Liquidia's NOD of Steven Nathan			H, R
PTX-0138	2024-02-26 [028] [SEALED] Nathan Declaration ISO Motion for PI			H, R
PTX-0139	Zisman 2010	UTC_PH-ILD_010830	UTC_PH-ILD_010838	
PTX-0140	Han 2013			
PTX-0141	Nathan 2019	UTC_PH-ILD_010530	UTC_PH-ILD_010540	
PTX-0142	Kolb et al. Nintedanib plus Sildenafil in Patients with Idiopathic Pulmonary Fibrosis. N Engl J Med. 2018 Nov 1;379(18):1722-1731.	UTC_PH-ILD_010487	UTC_PH-ILD_010496	
PTX-0143	Kolb 2018 - Supplementary Appendix			
PTX-0144	Intentionally Left Blank			
PTX-0145	U.S. Patent No. 11,826,327 (Peterson)	UTC_PH-ILD_005310	UTC_PH-ILD_005360	BE, OT, C
PTX-0146	Intentionally Left Blank			
PTX-0147	INCREASE Publication / Waxman 2021	UTC_PH-ILD_010790	UTC_PH-ILD_010829	BE, OT, C
PTX-0148	Intentionally Left Blank			

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0149	2021 Tyvaso Label	UTC_PH-ILD_010744	UTC_PH-ILD_010758	BE, OT, C
PTX-0150	Intentionally Left Blank			
PTX-0151	Bajwa 2017	UTC_PH-ILD_009846	UTC_PH-ILD_009852	BE, OT, C
PTX-0152	Intentionally Left Blank			
PTX-0153	Wang 2017	UTC_PH-ILD_010782	UTC_PH-ILD_010789	BE, OT, C
PTX-0154	Intentionally Left Blank			
PTX-0155	Intentionally Left Blank			
PTX-0156	Intentionally Left Blank			
PTX-0157	2024-12-20 Expert Report of Steven D. Nathan, M.D.			BE, OT, H
PTX-0158	2025-02-21 Reply Expert Report of Steven D. Nathan, M.D. Regarding Infringement of U.S. Patent No. 11,826,327			BE, OT, R, H
PTX-0159	2025-01-23 Rebuttal Expert Report of Steven D. Nathan, M.D.			BE, OT, R, H
PTX-0160	Intentionally Left Blank			
PTX-0161	2025-02-21 Expert Report of Stephen Ogenstad, Ph.D.			BE, OT, R, H
PTX-0162	2024-07-17 Document Subpoena to Kishan Parikh			BE, OT, R, H
PTX-0163	Intentionally Left Blank			
PTX-0164	2015-12-18 Email from Rajagopal to Shadoan and Parikh re Decision re JCVP-15-732R1	PARIKH_PH-ILD_00000005	PARIKH_PH-ILD_00000007	BE, OT, R, H
PTX-0165	Duke Biography - Kishan S Parikh			BE, OT, R, H, FN
PTX-0166	2024-11-01 UTC Objections to Liquidia 30(b)(6) NOD			BE, OT, R, H
PTX-0167	Brian Patterson LinkedIn Profile/CV			BE, OT, R, H, FN
PTX-0168	UTC Form 10-Q - Q3 2024			BE, OT, R, 403, FN
PTX-0169	Cost of Sales Q1 2024: Summary, Tyvaso, Remodulin	UTC_PH-ILD_214738	UTC_PH-ILD_214741	BE, OT, R, 403, H
PTX-0170	Spreadsheet: 2023 Q1 COGS Flux	UTC_PH-ILD_214736	UTC_PH-ILD_214736	R, 403, FN, H, IC
PTX-0171	Spreadsheet: Q2 '24 Net Sales and Patient Counts	UTC_PH-ILD_214808	UTC_PH-ILD_214808	R, 403, FN, H, IC
PTX-0172	Spreadsheet: Pricing Model V1.7 9.30.24	UTC_PH-ILD_214647	UTC_PH-ILD_214647	R, 403, FN, H, IC
PTX-0173	2024-11-05 [183] Liquidia's NOD of Leigh Peterson			BE, OT, R, H
PTX-0174	Leigh Peterson, Ph.D. CV	UTC_PH-ILD_095740	UTC_PH-ILD_095746	BE, OT, R, H, FN
PTX-0175	Intentionally Left Blank			
PTX-0176	Intentionally Left Blank			
PTX-0177	2017-11-30 Email from Badesch to Smith et al re INCREASE (RIN-PH-201) DMC Meeting	UTC_PH-ILD_143372	UTC_PH-ILD_143373	BE, OT, H, R
PTX-0178	2017-11-30 Letter from Badesch to Smith re DMC	UTC_PH-ILD_143374	UTC_PH-ILD_143374	BE, OT, H, R
PTX-0179	Intentionally Left Blank			
PTX-0180	2020-04-30 Email from Silverstein to Deng re treprostinil anti-fibrotic effect	UTC_PH-ILD_144553	UTC_PH-ILD_144556	BE, OT, H, R
PTX-0181	Treprostinil's Diverse Pharmacologic Profile Attenuates Fibrosis and Induces Bronchodilation, Adam Silverstein, Ph.D.	UTC_PH-ILD_144557	UTC_PH-ILD_144559	BE, OT, H, R
PTX-0182	SOW - Saggar (July 2017)	UTC_PH-ILD_095800	UTC_PH-ILD_095802	BE, OT, H, R, 403
PTX-0183	Amended and Restated SOW - Wasman (March 2017)	UTC_PH-ILD_112128	UTC_PH-ILD_112130	BE, OT, H, R, 403
PTX-0184	Rajeev and Rajan Saggar Presentation for UTC	UTC_PH-ILD_095813	UTC_PH-ILD_095837	BE, OT, H, R
PTX-0185	Corte 2014 (Bosentan Article)	UTC_PH-ILD_095838	UTC_PH-ILD_095847	BE, OT, R
PTX-0186	2024-07-17 Document Subpoena to Rajan Saggar			BE, OT, H, R
PTX-0187	Intentionally Left Blank			
PTX-0188	2024-07-17 Liquidia Notice of Document and Deposition Subpoenas to Rajan Saggar			BE, OT, H, R
PTX-0189	2024-07-26 [112] UTC Notice of Document and Deposition Subpoenas to Rajan Saggar			BE, OT, H, R
PTX-0190	UCLA Health - Rajan Saggar Profile			BE, OT, R, H, FN
PTX-0191	2024-09-17 Rajan Saggar Deposition Transcript			BE, OT, R, H
PTX-0192	2024-03-15 [048] Protective Order			BE, OT, R, H
PTX-0193	Consulting Agreement between UTC and Rajan Saggar dated October 13, 2007	UTC_PH-ILD_219078	UTC_PH-ILD_219086	BE, OT, R, 403, H
PTX-0194	Consulting Agreement between UTC and Rajan Saggar dated July 14, 2009	UTC_PH-ILD_219090	UTC_PH-ILD_219093	BE, OT, R, 403, H

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0195	Consulting Agreement between UTC and Rajan Saggar dated November 15, 2010	UTC_PH-ILD_219094	UTC_PH-ILD_219098	BE, OT, R, 403, H
PTX-0196	Amendment to HCP Consulting Agreement between UTC and Rajan Saggar dated April 3, 2012	UTC_PH-ILD_219087	UTC_PH-ILD_219089	BE, OT, R, 403, H
PTX-0197	Confidentiality and Non-disclosure Agreement between UTC and UCLA dated April 7, 2014	UTC_PH-ILD_219052	UTC_PH-ILD_219055	BE, OT, R, H, FN
PTX-0198	Clinical Study Agreement between Lung Biotechnology and Rajan Saggar dated September 10, 2014	UTC_PH-ILD_219031	UTC_PH-ILD_219047	BE, OT, R, 403, H
PTX-0199	Confidentiality and Non-disclosure Agreement between UTC and UCLA dated March 6, 2015	UTC_PH-ILD_219048	UTC_PH-ILD_219051	BE, OT, R, H, FN
PTX-0200	Confidentiality and Non-disclosure Agreement between UTC and UCLA dated November 3, 2015	UTC_PH-ILD_219001	UTC_PH-ILD_219004	BE, OT, R, H, FN
PTX-0201	HCP Consulting Agreement between UTC and Rajan Saggar dated March 10, 2017	UTC_PH-ILD_219105	UTC_PH-ILD_219115	BE, OT, R, 403, H
PTX-0202	HCP Master Consulting Agreement between UTC and Rajan Saggar dated April 15, 2019	UTC_PH-ILD_219020	UTC_PH-ILD_219030	BE, OT, R, 403, H
PTX-0203	SOW to HCP Master Consulting Agreement between UTC and Rajan Saggar dated April 15, 2019	UTC_PH-ILD_219017	UTC_PH-ILD_219019	BE, OT, R, 403, H
PTX-0204	HCP Master Consulting Agreement between UTC and Rajan Saggar dated April 1, 2021	UTC_PH-ILD_219005	UTC_PH-ILD_219016	BE, OT, R, 403, H
PTX-0205	HCP Master Consulting Agreement between UTC and Rajan Saggar dated March 1, 2024	UTC_PH-ILD_219056	UTC_PH-ILD_219067	BE, OT, R, 403, H
PTX-0206	Liquidia Statement of Changes in Beneficial Ownership			BE, OT, R, 403
PTX-0207	Liquidia Consulting Agreement for Healthcare Professionals dated November 10, 2021	LIQ_PH-ILD_00133871	LIQ_PH-ILD_00133888	BE, OT, R, 403
PTX-0208	First Amendment to Consulting Agreement between Liquidia and Rajan Saggar dated November 9, 2022	LIQ_PH-ILD_00133864	LIQ_PH-ILD_00133870	BE, OT, R, 403
PTX-0209	Liquidia Consulting Agreement for Healthcare Professionals dated February 20, 2024	LIQ_PH-ILD_00133889	LIQ_PH-ILD_00133905	BE, OT, R, 403
PTX-0210	2020-05-27 Liquidia PAH Expert Input Meeting - Physicians Executive Summary	LIQ_PH-ILD_00113964	LIQ_PH-ILD_00113978	BE, OT, R, FN
PTX-0211	2022-11-30 Liquidia Steering Committee Meeting	LIQ_PH-ILD_00116494	LIQ_PH-ILD_00116520	BE, OT, R, FN
PTX-0212	2024-03-28 Email from Patel to Rajan Saggar re Signature requested on "Dr. Saggar Advocacy Letter - Liquidia"	LIQ_PH-ILD_00144796	LIQ_PH-ILD_00144798	BE, OT, R, H
PTX-0213	Rajan Saggar Open Payments Data			BE, OT, R, 403, IC, FN, H
PTX-0214	Rajan Saggar Open Payments Data			BE, OT, R, 403, IC, FN, H
PTX-0215	Rajan Saggar Open Payments Data			BE, OT, R, 403, IC, FN, H
PTX-0216	Rajan Saggar Open Payments Data			BE, OT, R, 403, IC, FN, H
PTX-0217	Rajan Saggar Open Payments Data			BE, OT, R, 403, IC, FN, H
PTX-0218	Rajan Saggar Open Payments Data			BE, OT, R, 403, IC, FN, H
PTX-0219	Rajan Saggar Open Payments Data			BE, OT, R, 403, IC, FN, H
PTX-0220	I'm Aware That I'm Rare: Rajan Saggar, MD (463), April 8, 2024			H, R, 403
PTX-0221	Intentionally Left Blank			
PTX-0222	Intentionally Left Blank			
PTX-0223	Intentionally Left Blank			
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PTX-0225	Intentionally Left Blank			
PTX-0226	Intentionally Left Blank			
PTX-0227	Intentionally Left Blank			
PTX-0228	2025-04-09 [289] Liquidia NOD to Rajan Saggar			H, R
PTX-0229	2024-04-08 I'm Aware That I'm Rare: Rajan Saggar, MD (463)	UTC_PH-ILD_227551	UTC_PH-ILD_227562	H, R, 403, C
PTX-0230	2024-04-08 I'm Aware That I'm Rare: Rajan Saggar, MD (463) Certified Transcription	UTC_PH-ILD_227546	UTC_PH-ILD_227550	H, R, 403, C
PTX-0231	2024-04-08 I'm Aware That I'm Rare: Rajan Saggar, MD (463) Youtube screenshot	UTC_PH-ILD_227563	UTC_PH-ILD_227564	H, R, 403, C
PTX-0232	Shino 2013	UTC_PH-ILD_227567	UTC_PH-ILD_227586	H, R
PTX-0233	Lynch III 2016	UTC_PH-ILD_020784	UTC_PH-ILD_020810	H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0234	Tseng 2018	UTC_PH-ILD_227587	UTC_PH-ILD_227595	H, R
PTX-0235	Buono, Brutto, and Cattivo 2014	UTC_PH-ILD_227565	UTC_PH-ILD_227566	H, R
PTX-0236	Rajeev Saggar LinkedIn Profile/CV			BE
PTX-0237	2019-01-07 Email from Rajeev Saggar to Peterson re Arena and Medical Opportunity	UTC_PH-ILD_095797	UTC_PH-ILD_095798	403, H, R
PTX-0238	2024-10-08 UTC 30(b)(6) NOD to Liquidia			R, H
PTX-0239	NDA 213005 Section 2.2 Introduction to Summary	LIQ_PH-ILD_00046359	LIQ_PH-ILD_00046362	H, R, 403
PTX-0240	2022-09-27 Email from Weidman to Rajeev Saggar re IND 129819 Type B Pre-sNDA Meeting Minutes (WRO)	LIQ_PH-ILD_00119469	LIQ_PH-ILD_00119478	H, R, 403
PTX-0241	2022-11-22 Email from Weidman to Jeffs re Yutrebia: draft Advice Request (FDA) - PH-ILD filing scenarios	LIQ_PH-ILD_00119653	LIQ_PH-ILD_00119654	H, R, 403
PTX-0242	2023-07-24 Email from Jeffs to Rajeev Saggar re URGENT NDA 213005	LIQ_PH-ILD_00123465	LIQ_PH-ILD_00123466	H, R, 403
PTX-0243	2017-06-08 Email from Rajan Saggar to Peterson et al re Need CVs please	UTC_PH-ILD_095811	UTC_PH-ILD_095847	H, R, 403
PTX-0244	2019-10-04 Email from Broderick to Turpin et al re PH associated with PF Bi-Weekly Touch-base	UTC_PH-ILD_095795	UTC_PH-ILD_095796	H, R, 403
PTX-0245	Spreadsheet: NDA Sequence Tracker	LIQ_PH-ILD_00130687	LIQ_PH-ILD_00130687	H, R, 403
PTX-0246	Spreadsheet: Regulatory Chronology Log, NDA 213005	LIQ_PH-ILD_00130689	LIQ_PH-ILD_00130689	H, R, 403
PTX-0247	Spreadsheet: Regulatory Chronology Log LIQ 861, IND No. 129819	LIQ_PH-ILD_00130690	LIQ_PH-ILD_00130690	H, R, 403
PTX-0248	Spreadsheet: us-regional.xml	LIQ_PH-ILD_00091017	LIQ_PH-ILD_00091017	R, BE
PTX-0249	Nov 2020 LIQ861 Steering Committee Meeting	LIQ_PH-ILD_00113881	LIQ_PH-ILD_00113896	403, FN, H, R
PTX-0250	Liquidia PH-ILD Advisory Board Meeting - Executive Summary (May 20, 2023)	LIQ_PH-ILD_00122627	LIQ_PH-ILD_00122652	403, FN, H, R
PTX-0251	2024-02-26 [029] [SEALED] Selck Declaration ISO Motion for PI			403, H, R, IO, FN
PTX-0252	UTC Tyvaso Forecast (2023-2035)	UTC_PH-ILD_009410	UTC_PH-ILD_009418	403, H, R
PTX-0253	2025-01-23 Expert Report of Frederic Selck, Ph.D.			403, H, R, IO, FN
PTX-0254	Peter Smith CV	UTC_PH-ILD_095758	UTC_PH-ILD_095763	H, R
PTX-0255	2015 Waxman Presentation	UTC_PH-ILD_082484	UTC_PH-ILD_082534	H
PTX-0256	Intentionally Left Blank			
PTX-0257	Intentionally Left Blank			
PTX-0258	Tyvaso in Pulmonary Hypertension Due to Interstitial Lung Disease (PH-ILD): The INCREASE Study	UTC_PH-ILD_081580	UTC_PH-ILD_081606	H
PTX-0259	2017-11-15 Email from Smith to Hobbs et al re INCREASE Study RIN-PH-201	UTC_LIQ00104554	UTC_LIQ00104554	H, FN
PTX-0260	Intentionally Left Blank			
PTX-0261	2018-09-24 UTC Science Day 2018 Edited Transcript	UTC_PH-ILD_00140569	UTC_PH-ILD_00140622	H, BE
PTX-0262	Waxman Presentation at UTC Science Day 2018	LIQ_PH-ILD_00101301	LIQ_PH-ILD_00101318	H
PTX-0263	2024-11-25 [215] Liquidia NOD of Shaun Snader			R, H
PTX-0264	Shaun Snader LinkedIn Profile/CV			H, R
PTX-0265	U.S. Patent No. 11,826,327 Prosecution History	UTC_PH-ILD_009419	UTC_PH-ILD_009771	
PTX-0266	Intentionally Left Blank			
PTX-0267	Intentionally Left Blank			
PTX-0268	Intentionally Left Blank			
PTX-0269	Intentionally Left Blank			
PTX-0270	Intentionally Left Blank			
PTX-0271	Intentionally Left Blank			
PTX-0272	2022-08-31 UTC Press Release	LIQ_PH-ILD_00101319	LIQ_PH-ILD_00101320	R, H, 403
PTX-0273	2023-07-24 [061] Decision (Fed. Cir. 22-2217, 23-1021)	LIQ_PH-ILD_00101446	LIQ_PH-ILD_00101468	BRPL
PTX-0274	2023-04-05 [083] Patent Owner's Notice of Appeal (IPR2021-00406)	LIQ_PH-ILD_00101699	LIQ_PH-ILD_00101703	BRPL, H, 403
PTX-0275	2023-05-10 [007] UTC Entry of Appearance (Fed. Cir. 23-1805)	LIQ_PH-ILD_00101851	LIQ_PH-ILD_00101852	BRPL, H
PTX-0276	2023-08-04 [017] UTC Opening Brief (Fed. Cir. 23-1805)	LIQ_PH-ILD_00101853	LIQ_PH-ILD_00101935	BRPL, H, 403
PTX-0277	2023-12-20 [052] Decision (Fed. Cir. 23-1805)	LIQ_PH-ILD_00101207	LIQ_PH-ILD_00101219	BRPL
PTX-0278	2023-07-24 UTC Press Release	LIQ_PH-ILD_00101321	LIQ_PH-ILD_00101322	403, H, R
PTX-0279	2024-02-12 UTC Letter to FDA re NDA 213005 – YUTREPIA	LIQ_PH-ILD_00000847	LIQ_PH-ILD_00000864	403, H, R
PTX-0280	2015-09-16 Email from Lim to Waxman et al re RIN-PH-201 Steering Committee Minutes from 9.14.15	UTC_PH-ILD_073731	UTC_PH-ILD_073733	H, FN
PTX-0281	INCREASE Protocal (Amendment 3)	UTC_PH-ILD_105083	UTC_PH-ILD_105152	H, IC

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0282	Intentionally Left Blank			
PTX-0283	INCREASE Steering Committee Slides	UTC_PH-ILD_148528	UTC_PH-ILD_148574	BE
PTX-0284	Intentionally Left Blank			
PTX-0285	Intentionally Left Blank			
PTX-0286	2025-01-23 Rebuttal Expert Report of Ronald A. Thisted, Ph.D.			R, H
PTX-0287	2025-02-21 Reply Expert Report of Ronald A. Thisted, Ph.D.			R, H
PTX-0288	Janet Tully LinkedIn Profile			R, 403, H
PTX-0289	2024-04-01 Defendant's 26(a)(1) Initial Disclosures			
PTX-0290	NDA 213005 Resubmission (SN0030)	LIQ_PH-ILD_00012800	LIQ_PH-ILD_00012867	R
PTX-0291	Yutrepia Label	LIQ_PH-ILD_00126017	LIQ_PH-ILD_00126055	R, 403
PTX-0292	2024-11-07 Liquidia's NOD of Michael Wade			R
PTX-0293	Michael Wade LinkedIn Profile/CV			R, H
PTX-0294	Remodulin Final Study Report (Aug. 11, 2006)	UTC-Sand-Rem00961422	UTC-Sand-Rem00961531	R, H
PTX-0295	Intentionally Left Blank			
PTX-0296	Intentionally Left Blank			
PTX-0297	Intentionally Left Blank			
PTX-0298	Intentionally Left Blank			
PTX-0299	Intentionally Left Blank			
PTX-0300	Intentionally Left Blank			
PTX-0301	Aaron B. Waxman Harvard Medical School CV	UTC_LIQ00254745	UTC_LIQ00254786	R, H
PTX-0302	Intentionally Left Blank			
PTX-0303	12th John Vane Memorial Symposium on Prostacyclin Science and Pulmonary Vascular Disease, 17-18 March 2017	LIQ_PH-ILD_00147323	LIQ_PH-ILD_00147327	R
PTX-0304	2017-05-22 12th Annual John Vane Memorial Symposium Transcript	LIQ_PH-ILD_00147328	LIQ_PH-ILD_00147354	R, H
PTX-0305	2025-03-06 [263] Liquidia NOD of Bradley Wertheim			R
PTX-0306	2025-01-23 Rebuttal Expert Report of Bradley M. Wertheim, M.D.			R, H
PTX-0307	Exhibit 1 - Bradley M. Wertheim, M.D. Harvard Medical School CV			R, H
PTX-0308	INCREASE Protocol	UTC_PH-ILD_145360	UTC_PH-ILD_145594	R, H
PTX-0309	Simonneau 2019	UTC_PH-ILD_221283	UTC_PH-ILD_221295	R, H
PTX-0310	Nathan 2019	UTC_PH-ILD_220938	UTC_PH-ILD_220952	R, H
PTX-0311	Tyvaso Label (Rev. May 2022)			R, 403, H
PTX-0312	2022-06-20 Corporate Overview	LIQ_PH-ILD_00000536	LIQ_PH-ILD_00000563	R, 403
PTX-0313	Liquidia Corporation 2023 Form 10-K	LIQ_PH-ILD_00002010	LIQ_PH-ILD_00002397	R, 403
PTX-0314	NDA 213005 Section 2.6	LIQ_PH-ILD_00045498	LIQ_PH-ILD_00045508	R, 403
PTX-0315	Original NDA	LIQ_PH-ILD_00045978	LIQ_PH-ILD_00045979	R, 403, Dep
PTX-0316	Original NDA Form	LIQ_PH-ILD_00046054	LIQ_PH-ILD_00046058	R, 403
PTX-0317	Amended Application Form	LIQ_PH-ILD_00091023	LIQ_PH-ILD_00091027	R, 403, Dep
PTX-0318	March 28, 2022 Corporate Overview	LIQ_PH-ILD_00113351	LIQ_PH-ILD_00113385	R, 403
PTX-0319	May 2021 Corporate Overview	LIQ_PH-ILD_00113476	LIQ_PH-ILD_00113496	R, 403
PTX-0320	Liquidia WiFi Presentation	LIQ_PH-ILD_00117779	LIQ_PH-ILD_00117922	R, 403, Dep
PTX-0321	First Guidance Request	LIQ_PH-ILD_00119923	LIQ_PH-ILD_00119924	R, 403, H, Dep
PTX-0322	2022-12-20 Email from R. Saggar to J. Weidman re: NDA 213005	LIQ_PH-ILD_00119927	LIQ_PH-ILD_00119929	403, FN, H, R
PTX-0323	2022-12-20 Email from J. Weidman to R. Saggar re: Tentative NDA Approval	LIQ_PH-ILD_00119930	LIQ_PH-ILD_00119969	403, FN, H, R, IC
PTX-0324	2023-06-28 Email from J. Weidman to R. Saggar attaching FDA Communication 06282023	LIQ_PH-ILD_00122995	LIQ_PH-ILD_00122998	403, FN, H, R, IC
PTX-0325	2023-06-29 Email from J. Weidman to R. Saggar attaching Draft FDA Communication	LIQ_PH-ILD_00123004	LIQ_PH-ILD_00123005	403, FN, H, R, IC
PTX-0326	2023-06-29 Email from R. Saggar to J. Weidman re NDA 213005 (Weidman Amendment Inquiry)	LIQ_PH-ILD_00123030	LIQ_PH-ILD_00123031	403, FN, H, R, IC
PTX-0327	2023-07-22 Email from J. Weidman to R. Saggar re NDA 213005 General Advise Letter	LIQ_PH-ILD_00123449	LIQ_PH-ILD_00123454	403, FN, H, R, IC
PTX-0328	2023-07-24 Email from J. Weidman to R. Saggar re URGENT NDA 213005 (Weidman Inquiry Follow Up)	LIQ_PH-ILD_00123460	LIQ_PH-ILD_00123462	403, FN, H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0329	CVrg Market Strategies Pulmonary Hypertension 2022-2031 Region of Analysis: USA/EU/Japan (2Q 2022)	LIQ_PH-ILD_00125356	LIQ_PH-ILD_00125622	R, H
PTX-0330	CVrg Market Strategies Pulmonary Hypertension 2022-2031 Region of Analysis: USA/EU/Japan (1Q 2022)	LIQ_PH-ILD_00126127	LIQ_PH-ILD_00126377	R, H
PTX-0331	CVrg Market Strategies Pulmonary Hypertension 2022-2031 Region of Analysis: USA/EU/Japan (4Q 2022)	LIQ_PH-ILD_00129637	LIQ_PH-ILD_00129886	R, H
PTX-0332	CVrg Market Strategies Pulmonary Hypertension 1Q 2023	LIQ_PH-ILD_00129936	LIQ_PH-ILD_00130174	R, H
PTX-0333	CVrg Sentinel Pulmonary Hypertension June 2023	LIQ_PH-ILD_00130333	LIQ_PH-ILD_00130350	R, H
PTX-0334	CVrg Market Strategies Pulmonary Hypertension 2Q 2023	LIQ_PH-ILD_00130351	LIQ_PH-ILD_00130593	R, H
PTX-0335	Spreadsheet: IND Sequence Tracker	LIQ_PH-ILD_00130688	LIQ_PH-ILD_00130688	R, 403, FN
PTX-0336	Spreadsheet: IND Regulatory Chronology Log	LIQ_PH-ILD_00130690	LIQ_PH-ILD_00130690	R, 403, FN
PTX-0337	Liquidia Corporation May 2022 Corporate Overview	LIQ_PH-ILD_00133084	LIQ_PH-ILD_00133111	R, H
PTX-0338	Liquidia Corporation August 1, 2022 Corporate Overview	LIQ_PH-ILD_00133155	LIQ_PH-ILD_00133182	R, H
PTX-0339	January 10, 2024 J.P. Morgan Conference	LIQ_PH-ILD_00133247	LIQ_PH-ILD_00133257	R, H
PTX-0340	IND Annual Report IND 129819 30 September 2022 - 29 September 2023	LIQ_PH-ILD_00140488	LIQ_PH-ILD_00140493	R, H
PTX-0341	Liquidia Corporation 2022 Form 10-K	LIQ_PH-ILD_00141701	LIQ_PH-ILD_00142008	R
PTX-0342	Liquidia Corporation June 30, 2023 FORM 10-Q	LIQ_PH-ILD_00142130	LIQ_PH-ILD_00142362	R
PTX-0343	Liquidia Corporation September 30, 2023 FORM 10-Q	LIQ_PH-ILD_00142363	LIQ_PH-ILD_00142458	R
PTX-0344	2024 CHEST Poster	LIQ_PH-ILD_00142624	LIQ_PH-ILD_00142624	R, 403, H
PTX-0345	March 13, 2024 Press Release	LIQ_PH-ILD_00143338	LIQ_PH-ILD_00143343	R, 403
PTX-0346	Liquidia Corporation November 30, 2023 FORM 8-K	LIQ_PH-ILD_00143563	LIQ_PH-ILD_00143565	R
PTX-0347	Liquidia Corporation June 28, 2023 FORM 8-K	LIQ_PH-ILD_00143614	LIQ_PH-ILD_00143616	R
PTX-0348	Yutrepla Homepage Mockup 2	LIQ_PH-ILD_00146936	LIQ_PH-ILD_00146941	R, 403
PTX-0349	Draft Press Release - U.S. FDA Approves Liquidia's Yutrepla	LIQ_PH-ILD_00146949	LIQ_PH-ILD_00146953	R, 403
PTX-0350	2022-05-25 Email from J. Weidman to T. Shah re Pre-sNDA Meeting Minutes	LIQ_PH-ILD_00148509	LIQ_PH-ILD_00148509	403, FN, H, R
PTX-0351	TRIUMPH at Clinical Trials	UTC_LIQ00011054	UTC_LIQ00011061	R, 403, H
PTX-0352	ASCENT at Clinical Trials	UTC_PH-ILD_000395	UTC_PH-ILD_000404	R, 403, H
PTX-0353	Liquidia's June 27, 2023 Press Release	UTC_PH-ILD_003160	UTC_PH-ILD_003161	R, 403
PTX-0354	UTC Press Release - September 22, 2023	UTC_PH-ILD_009797	UTC_PH-ILD_009799	R, 403, H
PTX-0355	Columm, et al., Pulmonary Hypertension Associated with Idiopathic Pulmonary Fibrosis Current and Future Perspective, Canadian Respiratory Journal Vol. 2017	UTC_PH-ILD_009869	UTC_PH-ILD_009880	R, H
PTX-0356	P.J. Engel, Invasive Techniques for Diagnosis of PH, Pulmonary Hypertension and Interstitial Lung Disease (2017)	UTC_PH-ILD_009891	UTC_PH-ILD_009906	R, H
PTX-0357	Liquidia's December 12, 2023 Notice Letter	UTC_PH-ILD_010498	UTC_PH-ILD_010525	R, H
PTX-0358	January 27, 2020 LIQ861 Press Release	UTC_PH-ILD_010528	UTC_PH-ILD_010529	R, 403
PTX-0359	Nunes, Pathology of Vascular Changes in Interstitial Lung Diseases. (2017)	UTC_PH-ILD_010541	UTC_PH-ILD_010580	R, 403, H
PTX-0360	NCT02630316 - Clinical Trials	UTC_PH-ILD_010629	UTC_PH-ILD_010651	R, 403, H
PTX-0361	Roscigno, et al. Pharmacokinetics and tolerability of LIQ861, a novel dry-powder formulation of treprostinil. Pulm Circ. 2020	UTC_PH-ILD_010670	UTC_PH-ILD_010678	R, 403, H
PTX-0362	Tyvaso Label 2023	UTC_PH-ILD_010727	UTC_PH-ILD_010743	R, 403, H
PTX-0363	Hill, et al. INSPIRE: Safety and tolerability of inhaled Yutrepla (treprostinil) in pulmonary arterial hypertension (PAH). Pulm Circ. 2022	UTC_PH-ILD_048704	UTC_PH-ILD_048714	R, 403, H
PTX-0364	Curriculum Vitae of CQ Deng, MB, MPH, PhD.	UTC_PH-ILD_095729	UTC_PH-ILD_095738	R, H
PTX-0365	Nathan, et al. Survival analysis from the INCREASE study in PH-ILD: evaluating the impact of treatment crossover on overall mortality. Thorax. 2024	UTC_PH-ILD_219116	UTC_PH-ILD_219121	R, 403, H
PTX-0366	United Therapeutics Corp. v. Liquidia Techs., Inc., No. 1:23-cv-00975-RGA, D.I. 8 (D. Del. Nov. 30, 2023) (First Amended Complaint)			R, BRPL
PTX-0367	Liquidia Techs., Inc. v. U.S. FDA, Case No. 24-cv-02428-TJK, D.I. 41 (D.D.C. October 4, 2024) (Redacted Memorandum Of Points And Authorities In Support Of Liquidia Technologies, Inc.'s Renewed Motion For A Preliminary Injunction And Motion For Summary Judgment)			R, BRPL
PTX-0368	PH News - Tyvaso Becomes 1st PH-ILD Treatment Approved in US	UTC_LIQ00258967	UTC_LIQ00258969	R, 403, H
PTX-0369	Intentionally Left Blank			

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0370	Revatio Product Label	UTC_PH-ILD_010652	UTC_PH-ILD_010664	R, 403, H
PTX-0371	Simonneau , et al. Haemodynamic definitions and updated clinical classification of pulmonary hypertension. Eur Respir J. 2019	UTC_PH-ILD_023739	UTC_PH-ILD_023751	R, 403, H
PTX-0372	Nathan, et al. Inhaled treprostinil and forced vital capacity in patients with interstitial lung disease and associated pulmonary hypertension: a post-hoc analysis of the INCREASE study. The Lancet Respiratory Medicine, Vol. 9, 2021 ("Post-hoc FVC Analysis")	UTC_PH-ILD_147114	UTC_PH-ILD_147122	R, 403, H
PTX-0373	NDA 213005 Section 2.5 Clinical Overview	LIQ_PH-ILD_00045509	LIQ_PH-ILD_00045555	R
PTX-0374	July 2023 Amendment	LIQ_PH-ILD_00091022	LIQ_PH-ILD_00091022	R
PTX-0375	July 25, 2023 Email from E. Vali (On behalf of R. Jeff) to Board re: Liquidia Corporation (LQDA, Buy 18.00): LQDA Clears '066 in HW Appeal. All Eyes Now on '793 IPR Appeal ("Jeffs Email to Board")	LIQ_PH-ILD_00113806	LIQ_PH-ILD_00113809	403, FN, H, R
PTX-0376	FDA Written Response	LIQ_PH-ILD_00119470	LIQ_PH-ILD_00119478	R, H
PTX-0377	2022-05-25 FDA Meeting Request - Written Responses	LIQ_PH-ILD_00120424	LIQ_PH-ILD_00120432	R, H
PTX-0378	Clinical Research Protocol	LIQ_PH-ILD_00124867	LIQ_PH-ILD_00124957	R, H
PTX-0379	J.P. Morgan Healthcare Conference Presentation - January 10, 2024	LIQ_PH-ILD_00133183	LIQ_PH-ILD_00133202	R, H, FN
PTX-0380	Liquidia Meeting Request Type B Pre-s NDA Meeting IND 129819	LIQ_PH-ILD_00134026	LIQ_PH-ILD_00134030	R
PTX-0381	Yutrepla Homepage Mockup	LIQ_PH-ILD_00146916	LIQ_PH-ILD_00146926	R, H, FN, A
PTX-0382	Yutrepla PAH and PH-ILD Now Approved Email	LIQ_PH-ILD_00146942	LIQ_PH-ILD_00146942	R, H, FN, A
PTX-0383	Liquidia Access	LIQ_PH-ILD_00146961	LIQ_PH-ILD_00146962	R, H, FN, A
PTX-0384	Formulary Kit	LIQ_PH-ILD_00146970	LIQ_PH-ILD_00146983	R, H, FN, A
PTX-0385	Yutrepla Approved Product Dossier	LIQ_PH-ILD_00146984	LIQ_PH-ILD_00147052	R, FN, A
PTX-0386	Yutrepla CuraScript Pamphlet	LIQ_PH-ILD_00147068	LIQ_PH-ILD_00147069	R, H, FN, A
PTX-0387	Sales Aid	LIQ_PH-ILD_00147141	LIQ_PH-ILD_00147153	R, H, FN, A
PTX-0388	Sales Aid 2	LIQ_PH-ILD_00147156	LIQ_PH-ILD_00147157	R, H, FN, A
PTX-0389	Yutrepla Starter Kit Insert	LIQ_PH-ILD_00147176	LIQ_PH-ILD_00147177	R, H, FN, A
PTX-0390	Yutrepla Patient Brochure	LIQ_PH-ILD_00147178	LIQ_PH-ILD_00147184	R
PTX-0391	Yutrepla Provider Presentation	LIQ_PH-ILD_00147196	LIQ_PH-ILD_00147310	R, H, FN, A
PTX-0392	First Amended ASCENT Clinical Research Protocol	LIQ_PH-ILD_00147607	LIQ_PH-ILD_00147697	R, H, FN, A
PTX-0393	November 22, 2024 Request for Final Approval	LIQ_PH-ILD_00148561	LIQ_PH-ILD_00148562	R
PTX-0394	Roscigno, et al. Comparative bioavailability of inhaled treprostinil administered as LIQ861 and Tyvaso® in healthy subjects, Vascular Pharmacology, Vol. 138, 2021	UTC_PH-ILD_010665	UTC_PH-ILD_010669	R, H, FN, A
PTX-0395	INCREASE Clinical Study Report	UTC_PH-ILD_055371	UTC_PH-ILD_055482	R, H, FN
PTX-0396	Supplementary Appendix - Post-hoc FVC Analysis	UTC_PH-ILD_112161	UTC_PH-ILD_112169	R, 403, H
PTX-0397	Intentionally Left Blank			
PTX-0398	Intentionally Left Blank			
PTX-0399	Saggar 2021	LIQ_PH-ILD_00002458	LIQ_PH-ILD_00002461	R, 403, H
PTX-0400	LeVarge & Channick 2012	LIQ_PH-ILD_00017040	LIQ_PH-ILD_00017051	R, H
PTX-0401	2017 Tyvaso Label	LIQ_PH-ILD_00044770	LIQ_PH-ILD_00044783	403, H, R
PTX-0402	May 2023 PH-ILD Advisory Board Presentation	LIQ_PH-ILD_00113499	LIQ_PH-ILD_00113650	R, H, FN
PTX-0403	May 2023 Liquidia PH-ILD Advisory Board Executive Summary	LIQ_PH-ILD_00122627	LIQ_PH-ILD_00122652	R, H, FN
PTX-0404	Liquidia PH-ILD: Identification, Screening, and Treatment Options Presentation	LIQ_PH-ILD_00133007	LIQ_PH-ILD_00133042	R, H, FN
PTX-0405	Aug. 2024 Liquidia's Yutrepla PH-ILD Draft Presentation	LIQ_PH-ILD_00145867	LIQ_PH-ILD_00145918	R, H, FN
PTX-0406	Sep. 2024 Email from Kayla Noyes to Richard Channick	LIQ_PH-ILD_00146714	LIQ_PH-ILD_00146715	403, FN, H, R
PTX-0407	Liquidia PH-ILD Screening, Diagnosis, and Future Research Presentation	LIQ_PH-ILD_00146716	LIQ_PH-ILD_00146745	R, H, FN
PTX-0408	Intentionally Left Blank			
PTX-0409	June 24, 2010 email from Griselda Maldonado to Rajan Saggar	SAGGAR_PH-ILD_000001	SAGGAR_PH-ILD_000001	403, FN, H, R
PTX-0410	Intentionally Left Blank			
PTX-0411	May 23, 2022 NDA No. 214324 Approval Letter	UTC_PH-ILD_000635	UTC_PH-ILD_000638	R, H
PTX-0412	Adempas Label	UTC_PH-ILD_009800	UTC_PH-ILD_009827	403, H, R
PTX-0413	Behr 2020	UTC_PH-ILD_009853	UTC_PH-ILD_009863	H, R
PTX-0414	Corte 2014	UTC_PH-ILD_009881	UTC_PH-ILD_009890	H, R

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PTX-0415	Esbriet Label	UTC_PH-ILD_009907	UTC_PH-ILD_009927	403, H, R
PTX-0416	Fabyan 2023	UTC_PH-ILD_009928	UTC_PH-ILD_009935	H, R
PTX-0417	B. Maron et al., Pulmonary Hypertension: Basic Science to Clinical Medicine. Springer 2016	UTC_PH-ILD_009985	UTC_PH-ILD_010355	H, R
PTX-0418	Krowka 2007	UTC_PH-ILD_010497	UTC_PH-ILD_010497	H, R
PTX-0419	Intentionally Left Blank			
PTX-0420	Ofev Label	UTC_PH-ILD_010581	UTC_PH-ILD_010598	403, H, R
PTX-0421	Ventavis Label	UTC_PH-ILD_010759	UTC_PH-ILD_010773	403, H, R
PTX-0422	UTC 8-K 2022	UTC_PH-ILD_010839	UTC_PH-ILD_010841	R, 403, FN
PTX-0423	Channick 2012	UTC_PH-ILD_015001	UTC_PH-ILD_015010	R, 403, H
PTX-0424	Feb. 2020 email from Leigh Peterson to Heidi Bell, Lisa Edwards, CQ Deng, and Peter Smith	UTC_PH-ILD_145720	UTC_PH-ILD_145724	403, FN, H, R
PTX-0425	Rebuttal Expert Report of Dr. Nicholas Hill, United Therapeutics Corp. v. Liquidia Techs., Inc., No. 20-755 (D. Del. Nov. 12, 2021)	UTC_PH-ILD_219122	UTC_PH-ILD_219169	R, 403, H
PTX-0426	2022 ESC/ERS Pulmonary Hypertension Guidelines	UTC_PH-ILD_219170	UTC_PH-ILD_219283	R, H
PTX-0427	Anderson 2017	UTC_PH-ILD_219284	UTC_PH-ILD_219284	H, R
PTX-0428	ARTEMIS-IPF study	UTC_PH-ILD_219285	UTC_PH-ILD_219305	H, R
PTX-0429	Barst 2012	UTC_PH-ILD_219306	UTC_PH-ILD_219314	H, R
PTX-0430	Bellerophon Press Release	UTC_PH-ILD_219315	UTC_PH-ILD_219319	R, H
PTX-0431	BUILD 3 Study	UTC_PH-ILD_219320	UTC_PH-ILD_219338	H, R
PTX-0432	Channick 2024	UTC_PH-ILD_219339	UTC_PH-ILD_219366	H, R, 403
PTX-0433	Gunther 2007	UTC_PH-ILD_219379	UTC_PH-ILD_219385	H, R
PTX-0434	Hill 2020	UTC_PH-ILD_219386	UTC_PH-ILD_219388	H, R, 403
PTX-0435	Hooper 2009	UTC_PH-ILD_219389	UTC_PH-ILD_219400	H, R
PTX-0436	Hooper 2013	UTC_PH-ILD_219401	UTC_PH-ILD_219408	H, R
PTX-0437	Iloprost (ACTIVE) Study	UTC_PH-ILD_219409	UTC_PH-ILD_219417	H, R
PTX-0438	BUILD-3 Publication	UTC_PH-ILD_219418	UTC_PH-ILD_219425	H, R
PTX-0439	LeVarge 2015	UTC_PH-ILD_219426	UTC_PH-ILD_219433	H, R
PTX-0440	Madden 2006	UTC_PH-ILD_219434	UTC_PH-ILD_219438	H, R
PTX-0441	Malik 2013	UTC_PH-ILD_219439	UTC_PH-ILD_219439	H, R
PTX-0442	MELODY-1 Study	UTC_PH-ILD_219440	UTC_PH-ILD_219451	H, R
PTX-0443	Parikh 2021	UTC_PH-ILD_219467	UTC_PH-ILD_219468	H, R
PTX-0444	PCMH Congress YouTube Video	UTC_PH-ILD_219469	UTC_PH-ILD_219530	403, A, FN, H, R, BE
PTX-0445	PHAware YouTube Video	UTC_PH-ILD_219531	UTC_PH-ILD_219545	403, A, FN, H, R, BE
PTX-0446	Price 2010	UTC_PH-ILD_219546	UTC_PH-ILD_219567	H, R
PTX-0447	Raghu 2013	UTC_PH-ILD_219568	UTC_PH-ILD_219587	H, R
PTX-0448	Riddell 2014	UTC_PH-ILD_219588	UTC_PH-ILD_219588	H, R
PTX-0449	Saggar Giri 2021	UTC_PH-ILD_219589	UTC_PH-ILD_219600	H, R, 403
PTX-0450	June 3, 2022 U.S. Pharmacist Article	UTC_PH-ILD_219601	UTC_PH-ILD_219603	H, R
PTX-0451	Nathan 2022	UTC_PH-ILD_219632	UTC_PH-ILD_219645	H, R, 403
PTX-0452	STEP-IPF Study	UTC_PH-ILD_219646	UTC_PH-ILD_219665	H, R
PTX-0453	The BPHT Study	UTC_PH-ILD_219666	UTC_PH-ILD_219677	H, R
PTX-0454	The INSTAGE Study	UTC_PH-ILD_219678	UTC_PH-ILD_219695	H, R
PTX-0455	The RISE-IIP Study	UTC_PH-ILD_219696	UTC_PH-ILD_219714	H, R
PTX-0456	The Sildenafil with Pirfenidone Study	UTC_PH-ILD_219715	UTC_PH-ILD_219736	H, R
PTX-0457	Vachiery 2018	UTC_PH-ILD_219737	UTC_PH-ILD_219745	H, R
PTX-0458	WO 2016/205202	UTC_PH-ILD_219854	UTC_PH-ILD_219942	
PTX-0459	Weitzenblum 2009	UTC_PH-ILD_219943	UTC_PH-ILD_219955	H, R
PTX-0460	Califf 1997	UTC_PH-ILD_219956	UTC_PH-ILD_219966	H, R
PTX-0461	Collard 2007	UTC_PH-ILD_220186	UTC_PH-ILD_220191	H, R
PTX-0462	Walmarth 1997	UTC_WAT_00053566	UTC_WAT_00053574	H, R
PTX-0463	Intentionally Left Blank			
PTX-0464	Intentionally Left Blank			

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0465	<i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 1:20-cv-00755-RGA-JLH, D.I. 402 (D. Del. March 28, 2022) (Case No. 20-cv-00755 Trial Tr. – Day 1)			IE, R, H, NI, 403
PTX-0466	<i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 1:20-cv-00755-RGA-JLH, D.I. 404 (D. Del. March 30, 2022) (Case No. 20-cv-00755 Trial Tr. – Day 3)			IE, R, H, NI, 403
PTX-0467	<i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 1:20-cv-00755-RGA-JLH, D.I. 405 (D. Del. March 31, 2022) (Case No. 20-cv-00755 Trial Tr. – Day 4)			IE, R, H, NI, 403
PTX-0468	<i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 1:23-cv-00975-RGA, D.I. 12 (Defendant's Answer to First Amended Complaint and Counterclaims)			
PTX-0469	Intentionally Left Blank			
PTX-0470	Intentionally Left Blank			
PTX-0471	Nathan Barbera 2019	UTC_PH-ILD_219452	UTC_PH-ILD_219466	H, R, FN, A
PTX-0472	Spreadsheet: Preliminary ASCENT Study Results	LIQ_PH-ILD_00125264	LIQ_PH-ILD_00125264	R, 403
PTX-0473	Spreadsheet: Preliminary ASCENT 6MWD Data	LIQ_PH-ILD_00127287	LIQ_PH-ILD_00127287	R, 403
PTX-0474	ASCENT Clinical Trial Agreement–Regents of U. of Michigan	LIQ_PH-ILD_00132201	LIQ_PH-ILD_00132227	R, 403
PTX-0475	ASCENT Clinical Trial Agreement–The Univ. of North Carolina	LIQ_PH-ILD_00132255	LIQ_PH-ILD_00132279	R, 403
PTX-0476	ASCENT Clinical Trial Agreement–Regents of the U. of Minnesota	LIQ_PH-ILD_00132313	LIQ_PH-ILD_00132340	R, 403
PTX-0477	ASCENT Clinical Trial Agreement–U. of Rochester	LIQ_PH-ILD_00132391	LIQ_PH-ILD_00132419	R, 403
PTX-0478	(ASCENT) University of California, Los Angeles Research Subject Consent Form	LIQ_PH-ILD_00145464	LIQ_PH-ILD_00145481	R, 403
PTX-0479	Intentionally Left Blank			
PTX-0480	Spreadsheet: ASCENT Study Enrollment Data	LIQ_PH-ILD_00147891	LIQ_PH-ILD_00147891	H, R, FN, A
PTX-0481	Section 2.7.4 NDA Safety Update	LIQ_PH-ILD_00148554	LIQ_PH-ILD_00148560	
PTX-0482	Intentionally Left Blank			
PTX-0483	Collard 2016	UTC_PH-ILD_057737	UTC_PH-ILD_057747	H, R
PTX-0484	Kolb 2018 - Acute exacerbations of progressive-fibrosing interstitial lung diseases	UTC_PH-ILD_220828	UTC_PH-ILD_220835	H, R
PTX-0485	Raghu G., Idiopathic Pulmonary Fibrosis: Lessons from Clinical Trials Over the Past 25 Years, 50(4) Eur. Respir. J. 1701209 (2017).	UTC_PH-ILD_221153	UTC_PH-ILD_221163	H, R
PTX-0486	FDA Guidance, Determining the Extent of Safety Data Collection Needed in Late-Stage Premarket and Postapproval Clinical Investigations	UTC_PH-ILD_227280	UTC_PH-ILD_227290	H, R
PTX-0487	FDA Guidance, Investigator Responsibilities	UTC_PH-ILD_227291	UTC_PH-ILD_227308	R
PTX-0488	LIQ861 Pharmacokinetics Poster	UTC_PH-ILD_227309	UTC_PH-ILD_227309	H, R
PTX-0489	United Therapeutics Corp., RIN-PH-201 Statistical Analysis Plan for "A Multicenter, Randomized, Double-Blinded, Placebo-Controlled Trial to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Parenchymal Lung Disease" (Feb. 27, 2019)	UTC_PH-ILD_057509	UTC_PH-ILD_057547	H, R
PTX-0490	2024-04-19 Redacted Expert Declaration of Dr. Richard Channick (D.I. 70)			H, R
PTX-0491	Adrian G Barnett et al., Regression to the Mean: What It Is and How To Deal With It, 34 Int'l J. Epidemiology 215 (2005)	UTC_PH-ILD_226877	UTC_PH-ILD_226882	H, R
PTX-0492	Debra S. Echt et al., Mortality and Morbidity in Patients Receiving Encainide, Flecainide, or Placebo, 324 N. Eng. J. Med. 781 (1991)	UTC_PH-ILD_226895	UTC_PH-ILD_226902	H, R
PTX-0493	Excerpt of Charles H. Hennekens & Julie E. Buring, Epidemiology in Medicine (Sherry L Mayrent ed., 1987)	UTC_PH-ILD_226903	UTC_PH-ILD_226906	H, R
PTX-0494	Kallmes DF et al., A Randomized Trial of Vertebroplasty for Osteoporotic Spinal Fractures, 361 N. Eng. J. Med. 569 (2009)	UTC_PH-ILD_226907	UTC_PH-ILD_226917	H, R
PTX-0495	Tertiary Healthcare, NATIONAL LIBRARY OF MEDICINE SUBJECT HEADINGS THESAURUS (2024)	UTC_PH-ILD_226920	UTC_PH-ILD_226920	H, R
PTX-0496	Tertiary Care Centers, National Library of Medicine Subject Headings Thesaurus (2024), available at https://meshb-prev.nlm.nih.gov/record/ui?ui=D062606	UTC_PH-ILD_226918	UTC_PH-ILD_226919	H, R
PTX-0497	Joel Morganroth et al., Treatment of Ventricular Arrhythmias by United States Cardiologists: A Survey Before the Cardiac Arrhythmia Suppression Trial Results Were Available, 65 Am. J. Cardiology 40 (1990)	UTC_PH-ILD_226921	UTC_PH-ILD_226929	H, R
PTX-0498	Veronica Morton & David J Torgerson, Effect of Regression to the Mean on Decision Making in Health Care, 326 BMJ 1083 (2003)	UTC_PH-ILD_226930	UTC_PH-ILD_226931	H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0499	Susanna Naglie et al., Effect of Ivermectin vs Placebo on Time to Sustained Recovery in Outpatients With Mild to Moderate COVID-19, 328 JAMA 1595 (2022)	UTC_PH-ILD_227126	UTC_PH-ILD_227134	H, R
PTX-0500	Steven D. Nathan et al., Inhaled Treprostinil in Pulmonary Hypertension Associated With COPD: PERFECT Study Results, 63 Eur. Respiratory J. (2024)	UTC_PH-ILD_227135	UTC_PH-ILD_227146	H, R
PTX-0501	Version 1 of ClinicalTrials.gov Posting for "Safety and Efficacy of Inhaled Treprostinil in Adult PH With ILD Including CPFE" (NCT02630316) (Dec. 15, 2015)	UTC_PH-ILD_226932	UTC_PH-ILD_226954	H, R
PTX-0502	Version 24 of ClinicalTrials.gov Posting for "Safety and Efficacy of Inhaled Treprostinil in Adult PH With ILD Including CPFE" (NCT02630316) (Mar. 3, 2017)	UTC_PH-ILD_226955	UTC_PH-ILD_226996	H, R
PTX-0503	Version 85 of ClinicalTrials.gov Posting for "Safety and Efficacy of Inhaled Treprostinil in Adult PH With ILD Including CPFE" (NCT02630316) (Jan. 10, 2020)	UTC_PH-ILD_226997	UTC_PH-ILD_227025	H, R
PTX-0504	Version 88 of ClinicalTrials.gov Posting for "Safety and Efficacy of Inhaled Treprostinil in Adult PH With ILD Including CPFE" (NCT02630316) (June 2, 2020)	UTC_PH-ILD_227026	UTC_PH-ILD_227054	H, R
PTX-0505	Version 89 of ClinicalTrials.gov Posting for "Safety and Efficacy of Inhaled Treprostinil in Adult PH With ILD Including CPFE" (NCT02630316) (May 24, 2021)	UTC_PH-ILD_227055	UTC_PH-ILD_227109	H, R
PTX-0506	Version 1 of ClinicalTrials.gov Posting for "A Phase 3 Adaptive Study to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Participants With Pulmonary Hypertension (PH) Due to Chronic Obstructive Pulmonary Disease (COPD) (PERFECT)" (NCT03496623) (Apr. 12, 2018)	UTC_PH-ILD_227110	UTC_PH-ILD_227125	H, R
PTX-0507	D. L. Sackett, Rules of Evidence and Clinical Recommendations on the Use of Antithrombotic Agents, 95 Chest 2S (1989)	UTC_PH-ILD_227163	UTC_PH-ILD_227165	H, R
PTX-0508	David L. Sackett & William M. C. Rosenberg, On The Need for Evidence-Based Medicine, 4 Health Econ. 249 (1995)	UTC_PH-ILD_227166	UTC_PH-ILD_227171	H, R
PTX-0509	Pedro A. Torres-Saavedra & Kathryn A. Winter, An Overview of Phase 2 Clinical Trial Designs, 112 Int'l J. Radiation Oncology, Biol., Physics 22 (2022)	UTC_PH-ILD_227232	UTC_PH-ILD_227239	H, R
PTX-0510	Sowdhamini S. Wallace et al., Hierarchy of Evidence Within the Medical Literature, 12 Hospital Pediatrics 745 (2022)	UTC_PH-ILD_227240	UTC_PH-ILD_227244	H, R
PTX-0511	Michael Weber & Christian Hamm, Role of B-Type Natriuretic Peptide (BNP) and NT-proBNP in Clinical Routine, 92 Heart 843 (2006)	UTC_PH-ILD_227245	UTC_PH-ILD_227251	H, R
PTX-0512	Jiuyang Xu & Bin Cao, Lessons Learnt from Hydroxychloroquine/Azithromycin in Treatment of COVID-19, 59 Eur. Respiratory J. 2102002 (2022)	UTC_PH-ILD_227252	UTC_PH-ILD_227254	H, R
PTX-0513	Version 1 of ClinicalTrials.gov Posting for "Treprostinil Therapy For Patients With Interstitial Lung Disease And Severe Pulmonary Arterial Hypertension" (NCT00705133) (June 24, 2008)	UTC_PH-ILD_227147	UTC_PH-ILD_227162	H, R
PTX-0514	Patricia B. Burns et al., The Levels of Evidence and Their Role in Evidence-Based Medicine, 128 Plastic & Reconstructive Surgery 305 (2011)	UTC_PH-ILD_226883	UTC_PH-ILD_226893	H, R
PTX-0515	Bias, National Institutes of Health National Cancer Institute	UTC_PH-ILD_226894	UTC_PH-ILD_226894	H, R
PTX-0516	U.S. Food & Drug Admin., Scientific Review Supporting Proposed Administrative Order titled "Amending Over-the-Counter Monograph M012: Cold, Cough, Allergy, Bronchodilator, and Antiasthmatic Drug Products for Over-the-Counter Human Use" (Nov. 4, 2024)	UTC_PH-ILD_227172	UTC_PH-ILD_227227	H, R
PTX-0517	U.S. Food & Drug Admin., Summary of Proposed Order titled "Amending Over-the-Counter Monograph M012: Cold, Cough, Allergy, Bronchodilator, and Antiasthmatic Drug Products for Over-the-Counter Human Use"	UTC_PH-ILD_226875	UTC_PH-ILD_226876	H, R
PTX-0518	Supplementary Material 1 for Steven D. Nathan et al., Inhaled Treprostinil in Pulmonary Hypertension Associated With COPD: PERFECT Study Results, 63 Eur. Respiratory J. (2024)	UTC_PH-ILD_227255	UTC_PH-ILD_227277	H, R, 403
PTX-0519	Supplementary Material 2 for Steven D. Nathan et al., Inhaled Treprostinil in Pulmonary Hypertension Associated With COPD: PERFECT Study Results, 63 Eur. Respiratory J. (2024)	UTC_PH-ILD_227278	UTC_PH-ILD_227279	H, R, 403
PTX-0520	Version 1 of ClinicalTrials.gov Posting for "A Phase 3 Adaptive Study to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Participants With Pulmonary Hypertension (PH) Due to Chronic Obstructive Pulmonary Disease (COPD) (PERFECT)" (NCT03496623)	UTC_PH-ILD_010611	UTC_PH-ILD_010626	H, R, 403

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0521	Intentionally Left Blank			
PTX-0522	Intentionally Left Blank			
PTX-0523	BTIG, "MannKind Corporation (MNKD, Buy \$8 PT)," 11/9/2022.	UTC_PH-ILD_221715	UTC_PH-ILD_221732	H, R, 403
PTX-0524	Camacho, Nuno, Bas Donkers, and Stefan Stremersch (2011), "Predictably Non-Bayesian: Quantifying Salience Effects in Physician Learning About Drug Quality," <i>Marketing Science</i> 30(2): 305–320	UTC_PH-ILD_221763	UTC_PH-ILD_221778	H, R
PTX-0525	Ching, Andrew and Masakazu Ishihara (2010), "The Effects of Detailing on Prescribing Decisions Under Quality Uncertainty," <i>Quantitative Marketing and Economics</i> 8: 123–165	UTC_PH-ILD_221779	UTC_PH-ILD_221822	H, R
PTX-0526	Congressional Budget Office, "Research and Development in the Pharmaceutical Industry," 4/2021, https://www.cbo.gov/publication/57126	UTC_PH-ILD_221733	UTC_PH-ILD_221762	H, R, 403
PTX-0527	FDA, "Determining Whether to Submit an ANDA or a 505(b)(2) Application: Guidance for Industry," 5/2019, available at: https://www.fda.gov/media/124848/download	UTC_PH-ILD_221831	UTC_PH-ILD_221847	R
PTX-0528	FiercePharma, "With Inhaled Version of Tyvaso, United Therapeutics Sniffs a Potential Blockbuster," 5/24/2022, https://www.fiercepharma.com/pharma/inhaled-version-tyvaso-united-sniffs-potential-blockbuster/	UTC_PH-ILD_221853	UTC_PH-ILD_221854	H, R, 403
PTX-0529	Guha, Rahul, Jian Li, and Andrea L. Scott (2009), "The Economics of Commercial Success in Pharmaceutical Patent Litigation," <i>Landslide</i> 1(5)	UTC_PH-ILD_221875	UTC_PH-ILD_221879	H, R
PTX-0530	Harvard Business School, "How to Do a Cost-Benefit Analysis & Why It's Important," 5/9/2019, https://online.hbs.edu/blog/post/cost-benefit-analysis	UTC_PH-ILD_221880	UTC_PH-ILD_221883	R
PTX-0531	Haynes, Zachary, Abhimanyu Chandel, and Christopher King (2023), "Pulmonary Hypertension in Interstitial Lung Disease: Updates in Disease, Diagnosis, and Therapeutics," <i>Cells</i> 12(19): 2394	UTC_PH-ILD_221884	UTC_PH-ILD_221896	H, R
PTX-0532	Hill, Nicholas, et al (2022), "INSPIRE: Safety and Tolerability of Inhaled Yutrepla (treprostinil) in Pulmonary Arterial Hypertension (PAH)," <i>Pulmonary Circulation</i> 12(3): 1–11	UTC_PH-ILD_221897	UTC_PH-ILD_221907	H, R
PTX-0533	Insmed, Form 10-K, 2020	UTC_PH-ILD_221908	UTC_PH-ILD_222039	403, R
PTX-0534	Jefferies, "[3QEPS Preview] UTHR, TGTX, KNSA - Key #'s & Topics to Focus on," 10/28/2024	UTC_PH-ILD_222040	UTC_PH-ILD_222062	H, R, 403
PTX-0535	Ladenburg Thalman, "Tyvaso DPI Continues to Drive Revenue Growth; Reiterate Neutral; Raise PT to \$344," 10/31/2024	UTC_PH-ILD_222063	UTC_PH-ILD_222078	H, R, 403
PTX-0536	Liquidia Corporation, Form 10-K, 2022	UTC_PH-ILD_222083	UTC_PH-ILD_222390	403, R
PTX-0537	Liquidia Corporation, Form 10-K, 2023	UTC_PH-ILD_222391	UTC_PH-ILD_222778	403, R
PTX-0538	Liquidia Corporation, Form 10-Q, 2024-Q3	UTC_PH-ILD_222779	UTC_PH-ILD_222950	403, R
PTX-0539	Liquidia Press Release, "Liquidia Corporation Announces \$100 Million in New Financings," 1/4/2024, https://www.liquidia.com/news-releases/newsrelease-details/liquidia-corporation-announces-100-million-new-financings	UTC_PH-ILD_222951	UTC_PH-ILD_222952	H, R, 403
PTX-0540	Liquidia Press Release, "U.S. FDA Grants Tentative Approval of YUTREPIA (treprostinil) Inhalation Powder for Patients with Pulmonary Arterial Hypertension (PAH) and Pulmonary Hypertension Associated with Interstitial Lung Disease (PH-ILD)," 8/19/2024, https://www.liquidia.com/newsreleases/news-release-details/us-fda-grants-tentative-approval-yutrepiatm-treprostinil	UTC_PH-ILD_222953	UTC_PH-ILD_222954	H, R
PTX-0541	Liquidia Website, Commercial Products, https://www.liquidia.com/products-andpipeline/Commercial-Products	UTC_PH-ILD_223218	UTC_PH-ILD_223218	403, A, FN, H, R, BE
PTX-0542	Liquidia Website, Pipeline, https://www.liquidia.com/products-andpipeline/overview	UTC_PH-ILD_223219	UTC_PH-ILD_223219	403, A, FN, H, R, BE
PTX-0543	Liquidia Website, Publications, https://www.liquidia.com/products-andpipeline/publications	UTC_PH-ILD_222080	UTC_PH-ILD_222082	403, A, FN, H, R, BE
PTX-0544	Liquidia, "J.P. Morgan Healthcare Conference," 1/10/2024, available at: https://liquidia.com/static-files/83cf40bb-70ba-4345-90ed-307e89e0bafb	UTC_PH-ILD_221855	UTC_PH-ILD_221874	H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0545	Liquidia, "The ASCENT Study: An Open-Label Prospective Multicenter Study to Evaluate Safety and Tolerability of DPI LIQ861 (YUTREPIA) in Pulmonary Hypertension," 6/20/2024, available at: https://liquidia.com/staticfiles/e901e000-bbd0-43f4-94f2-657640b590cd	UTC_PH-ILD_222079	UTC_PH-ILD_222079	H, R
PTX-0546	Liquidia, Form 10-K, 2019	UTC_PH-ILD_222955	UTC_PH-ILD_223214	403, R
PTX-0547	Liquidia, Form 15, 11/30/2020	UTC_PH-ILD_223215	UTC_PH-ILD_223217	403, R
PTX-0548	Mayo Clinic Website, Pulmonary Hypertension, https://www.mayoclinic.org/diseases-conditions/pulmonaryhypertension/symptoms-causes/syc-20350697	UTC_PH-ILD_223220	UTC_PH-ILD_223232	403, H, R
PTX-0549	Morgan Stanley, "Tyvaso Outlook Intact," 2/23/2023	UTC_PH-ILD_223233	UTC_PH-ILD_223246	H, R, 403
PTX-0550	National Heart, Lung, and Blood Institute Website, Pulmonary Hypertension – Diagnosis, https://www.nhlbi.nih.gov/health/pulmonaryhypertension/diagnosis#	UTC_PH-ILD_223247	UTC_PH-ILD_223250	H, R
PTX-0551	National Heart, Lung, and Blood Institute Website, What are Interstitial Lung Diseases?, https://www.nhlbi.nih.gov/health/interstitial-lung-diseases	UTC_PH-ILD_223251	UTC_PH-ILD_223254	H, R
PTX-0552	National Organization for Rare Disorders Website, Pulmonary Arterial Hypertension, https://rarediseases.org/rare-diseases/pulmonary-arterialhypertension/	UTC_PH-ILD_223255	UTC_PH-ILD_223259	H, R
PTX-0553	Parikh, Raj, et al. (2022), "Pulmonary Hypertension in Patients With Interstitial Lung Disease: A Tool For Early Detection," <i>Pulmonary Circulation</i> 12(4): 1–11	UTC_PH-ILD_223267	UTC_PH-ILD_223277	H, R
PTX-0554	PR Newswire, "United Therapeutics Announces FDA Approval and Launch of Tyvaso for the Treatment of Pulmonary Hypertension Associated with Interstitial Lung Disease," 4/1/2021	UTC_PH-ILD_223260	UTC_PH-ILD_223266	H, R, 403
PTX-0555	Pulmonology Advisor, "Pulmonary Hypertension With ILD: Diagnostic and Treatment Challenges," 7/14/2020, https://www.pulmonologyadvisor.com/features/pulmonary-hypertension-withild-diagnostic-and-treatment-challenges	UTC_PH-ILD_223288	UTC_PH-ILD_223289	403, A, FN, H, R, BE
PTX-0556	Pulmonary Fibrosis Foundation Website, Pulmonary Hypertension Related to ILD (For Patients), https://www.pulmonaryfibrosis.org/researchers-healthcareproviders/clinical-resources/position-statements/pulmonary-hypertensionrelated-to-ild-for-patients	UTC_PH-ILD_223278	UTC_PH-ILD_223284	403, A, FN, H, R, BE
PTX-0557	Pulmonary Hypertension Association Website, About Pulmonary Hypertension, https://phassociation.org/types-pulmonary-hypertension-groups/	UTC_PH-ILD_223285	UTC_PH-ILD_223287	403, A, FN, H, R, BE
PTX-0558	Refinitiv Eikon, "Edited Transcript LQDA.OQ - Q1 2023 Liquidia Corp Earnings Call," 5/4/2023	UTC_PH-ILD_221656	UTC_PH-ILD_221664	H, R, 403, A, FN
PTX-0559	Refinitiv Eikon, "Edited Transcript Q4 2023 Liquidia Corp Earnings Call," 3/13/2024	UTC_PH-ILD_221703	UTC_PH-ILD_221714	H, R, 403, A, FN
PTX-0560	Refinitiv Eikon, "Liquidia Corp at JPMorgan Healthcare Conference," 1/10/2024	UTC_PH-ILD_223297	UTC_PH-ILD_223307	H, R, 403, A, FN
PTX-0561	Refinitiv Eikon, "LQDA.OQ - Q3 2023 Liquidia Corp Earnings Call," 11/7/2023	UTC_PH-ILD_221675	UTC_PH-ILD_221682	H, R, 403, A, FN
PTX-0562	Refinitiv Eikon, "United Therapeutics Corp at JPMorgan Healthcare Conference," 1/8/2024	UTC_PH-ILD_223290	UTC_PH-ILD_223296	H, R, 403, A, FN
PTX-0563	Refinitiv Eikon, "United Therapeutics Corp at UBS Global Healthcare Conference," 11/12/2024	UTC_PH-ILD_221691	UTC_PH-ILD_221702	H, R, 403, A, FN
PTX-0564	Refinitiv Eikon, "UTHR.OQ - Q1 2023 United Therapeutics Corp Earnings Call," 5/3/2023	UTC_PH-ILD_221645	UTC_PH-ILD_221655	H, R, 403, A, FN
PTX-0565	Refinitiv Eikon, "UTHR.OQ - Q2 2023 United Therapeutics Corp Earnings Call," 8/2/2023	UTC_PH-ILD_221665	UTC_PH-ILD_221674	H, R, 403, A, FN
PTX-0566	Refinitiv Eikon, "UTHR.OQ - Q4 2022 United Therapeutics Corp Earnings Call," 2/22/2023	UTC_PH-ILD_221635	UTC_PH-ILD_221644	H, R, 403, A, FN
PTX-0567	Refinitiv Eikon, "UTHR.OQ - United Therapeutics Corp at UBS BioPharma Conference," 11/8/2023	UTC_PH-ILD_221683	UTC_PH-ILD_221690	H, R, 403, A, FN
PTX-0568	Sood, Ashish, Eelco Kappe, and Stefan Stremersch (2014), "The Commercial Contribution of Clinical Studies for Pharmaceutical Drugs," <i>International Journal of Research in Marketing</i> 31(1): 65–77	UTC_PH-ILD_223308	UTC_PH-ILD_223320	R, H

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0569	TD Cowen, "Reports Q4; Tyvaso Continues Its Strong Trajectory," 2/21/2024	UTC_PH-ILD_223321	UTC_PH-ILD_223336	R, H, 403
PTX-0570	Treprostinil Injection Website, Home Page, https://trepinjection.com/	UTC_PH-ILD_223337	UTC_PH-ILD_223342	403, A, FN, H, R, BE
PTX-0571	Tyvaso Website, BREEZE Study, https://www.tyvasohcp.com/pah/efficacysafety/breeze-study/	UTC_PH-ILD_223463	UTC_PH-ILD_223468	403, A, FN, H, R, BE
PTX-0572	Tyvaso Website, Tyvaso DPI, https://www.tyvaso.com/pah/about-tyvaso/tyvasodpi/	UTC_PH-ILD_223469	UTC_PH-ILD_223473	403, A, FN, H, R, BE
PTX-0573	U.S. Food & Drug Administration Website, Patent and Exclusivity for: N214324 Patent Data, https://www.accessdata.fda.gov/scripts/cder/ob/patent_info.cfm?Product_No=004&Appl_No=214324&Appl_type=N	UTC_PH-ILD_223510	UTC_PH-ILD_223511	R
PTX-0574	U.S. Food & Drug Administration Website, Patent and Exclusivity for: N022387 Product 001 TREPROSTINIL (TYVASO) SOLUTION 0.6MG/ML, https://www.accessdata.fda.gov/scripts/cder/ob/patent_info.cfm?Product_No=001&Appl_No=022387&Appl_type=N	UTC_PH-ILD_223502	UTC_PH-ILD_223503	R
PTX-0575	U.S. Food & Drug Administration Website, Patent and Exclusivity for: N214324 Product 001 TREPROSTINIL (TYVASO DPI) POWDER 0.016MG/INH, https://www.accessdata.fda.gov/scripts/cder/ob/patent_info.cfm?Product_No=001&Appl_No=214324&Appl_type=N	UTC_PH-ILD_223504	UTC_PH-ILD_223505	R
PTX-0576	U.S. Food & Drug Administration Website, Patent and Exclusivity for: N214324 Product 002 TREPROSTINIL (TYVASO DPI) POWDER 0.032MG/INH, https://www.accessdata.fda.gov/scripts/cder/ob/patent_info.cfm?Product_No=002&Appl_No=214324&Appl_type=N	UTC_PH-ILD_223506	UTC_PH-ILD_223507	R
PTX-0577	U.S. Food & Drug Administration Website, Patent and Exclusivity for: N214324 Product 003 TREPROSTINIL (TYVASO DPI) POWDER 0.048MG/INH, https://www.accessdata.fda.gov/scripts/cder/ob/patent_info.cfm?Product_No=003&Appl_No=214324&Appl_type=N	UTC_PH-ILD_223508	UTC_PH-ILD_223509	R
PTX-0578	U.S. Food & Drug Administration Website, Patent and Exclusivity for: N214324 Product 005 TREPROSTINIL (TYVASO DPI) POWDER 0.08MG/INH, https://www.accessdata.fda.gov/scripts/cder/ob/patent_info.cfm?Product_No=005&Appl_No=214324&Appl_type=N	UTC_PH-ILD_223512	UTC_PH-ILD_223513	R
PTX-0579	U.S. Food & Drug Administration Website, Patent Use Codes and Definitions, U-3749, https://www.accessdata.fda.gov/scripts/cder/ob/results_patent.cfm	UTC_PH-ILD_221848	UTC_PH-ILD_221848	R
PTX-0580	U.S. Food & Drug Administration, "Small Business Assistance: Frequently Asked Questions for New Drug Product Exclusivity," 2/11/16, https://www.fda.gov/drugs/cder-small-business-industry-assistancesbia/small-business-assistance-frequently-asked-questions-new-drug-productexclusivity	UTC_PH-ILD_221849	UTC_PH-ILD_221852	R
PTX-0581	UCSF Health Website, Pulmonary Hypertension and Interstitial Lung Disease, https://www.ucsfhealth.org/education/pulmonary-hypertension-and-interstitial-lung-disease	UTC_PH-ILD_223474	UTC_PH-ILD_223479	403, A, FN, H, R, BE
PTX-0582	United Press Release, "United Therapeutics Announces BREEZE Study of Investigational Tyvaso DPI Meets Primary Objective," 1/28/2021, https://ir.unither.com/press-releases/2021/01-28-2021-145947593	UTC_PH-ILD_223480	UTC_PH-ILD_223484	403, A, FN, H, R, BE
PTX-0583	United Press Release, "United Therapeutics Announces FDA Approval of Tyvaso DPI," 5/24/2022, https://ir.unither.com/press-releases/2022/05-24-2022	UTC_PH-ILD_223485	UTC_PH-ILD_223488	403, A, FN, H, R, BE
PTX-0584	United Therapeutics Corporation v. Liquida Technologies, Inc., No. IPR2021-00406, Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board (PTAB Dec. 20, 2023)	UTC_PH-ILD_223489	UTC_PH-ILD_223501	403, H, R
PTX-0585	United, Form 10-K, 2011	UTC_PH-ILD_223514	UTC_PH-ILD_223673	403, R
PTX-0586	United, Form 10-K, 2012	UTC_PH-ILD_223674	UTC_PH-ILD_223843	403, R
PTX-0587	United, Form 10-K, 2013	UTC_PH-ILD_223844	UTC_PH-ILD_224023	403, R
PTX-0588	United, Form 10-K, 2014	UTC_PH-ILD_224024	UTC_PH-ILD_224213	403, R
PTX-0589	United, Form 10-K, 2015	UTC_PH-ILD_224214	UTC_PH-ILD_224370	403, R

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PTX-0590	United, Form 10-K, 2016	UTC_PH-ILD_224371	UTC_PH-ILD_224522	403, R
PTX-0591	United, Form 10-K, 2017	UTC_PH-ILD_224523	UTC_PH-ILD_224736	403, R
PTX-0592	United, Form 10-Q, 2018-Q1	UTC_PH-ILD_225668	UTC_PH-ILD_225727	403, R
PTX-0593	United, Form 10-Q, 2018-Q2	UTC_PH-ILD_225728	UTC_PH-ILD_225790	403, R
PTX-0594	United, Form 10-Q, 2018-Q3	UTC_PH-ILD_225791	UTC_PH-ILD_225856	403, R
PTX-0595	United, Form 10-K, 2018	UTC_PH-ILD_224737	UTC_PH-ILD_224946	403, R
PTX-0596	United, Form 10-Q, 2019-Q1	UTC_PH-ILD_225857	UTC_PH-ILD_225915	403, R
PTX-0597	United, Form 10-Q, 2019-Q2	UTC_PH-ILD_225916	UTC_PH-ILD_225981	403, R
PTX-0598	United, Form 10-Q, 2019-Q3	UTC_PH-ILD_225982	UTC_PH-ILD_226039	403, R
PTX-0599	United, Form 10-K, 2019	UTC_PH-ILD_224947	UTC_PH-ILD_225115	403, R
PTX-0600	United, Form 10-Q, 2020-Q1	UTC_PH-ILD_226040	UTC_PH-ILD_226104	403, R
PTX-0601	United, Form 10-Q, 2020-Q2	UTC_PH-ILD_226105	UTC_PH-ILD_226181	403, R
PTX-0602	United, Form 10-Q, 2020-Q3	UTC_PH-ILD_226182	UTC_PH-ILD_226239	403, R
PTX-0603	United, Form 10-K, 2020	UTC_PH-ILD_225116	UTC_PH-ILD_225238	403, R
PTX-0604	United, Form 10-Q, 2021-Q1	UTC_PH-ILD_226240	UTC_PH-ILD_226293	403, R
PTX-0605	United, Form 10-Q, 2021-Q2	UTC_PH-ILD_226294	UTC_PH-ILD_226350	403, R
PTX-0606	United, Form 10-Q, 2021-Q3	UTC_PH-ILD_226351	UTC_PH-ILD_226410	403, R
PTX-0607	United, Form 10-K, 2021	UTC_PH-ILD_225239	UTC_PH-ILD_225390	403, R
PTX-0608	United, Form 10-Q, 2022-Q1	UTC_PH-ILD_226411	UTC_PH-ILD_226470	403, R
PTX-0609	United, Form 10-Q, 2022-Q2	UTC_PH-ILD_226471	UTC_PH-ILD_226582	403, R
PTX-0610	United, Form 10-Q, 2022-Q3	UTC_PH-ILD_226583	UTC_PH-ILD_226638	403, R
PTX-0611	United, Form 10-K, 2022	UTC_PH-ILD_225391	UTC_PH-ILD_225536	403, R
PTX-0612	United, Form 10-Q, 2023-Q1	UTC_PH-ILD_226639	UTC_PH-ILD_226694	403, R
PTX-0613	United, Form 10-K, 2023	UTC_PH-ILD_225537	UTC_PH-ILD_225667	403, R
PTX-0614	United, Form 10-Q, 2024-Q3	UTC_PH-ILD_226695	UTC_PH-ILD_226752	403, R
PTX-0615	United, Tyvaso DPI Label, 10/2024, available at: https://dailymed.nlm.nih.gov/dailymed/fda/fdaDrugXsl.cfm?setid=ddc3d400-bcb3-4b09-aae2-0768b10a5b0f&type=display	UTC_PH-ILD_223343	UTC_PH-ILD_223446	403, H, R
PTX-0616	United, Tyvaso Label, 5/2022, available at: https://www.tyvaso.com/pdf/TYVASOPI	UTC_PH-ILD_223447	UTC_PH-ILD_223462	403, A, FN, H, R, BE
PTX-0617	Waxman, Aaron, et al. (2021), "Inhaled Treprostinil in Pulmonary Hypertension Due to Interstitial Lung Disease," The New England Journal of Medicine 384(4): 325-334	UTC_PH-ILD_226753	UTC_PH-ILD_226762	H, R
PTX-0618	Intentionally Left Blank			
PTX-0619	Intentionally Left Blank			
PTX-0620	Intentionally Left Blank			
PTX-0621	Intentionally Left Blank			
PTX-0622	Intentionally Left Blank			
PTX-0623	Intentionally Left Blank			
PTX-0624	Intentionally Left Blank			
PTX-0625	2022-05-22 Meeting Request - Written Responses	LIQ_PH-ILD_00113392	LIQ_PH-ILD_00113400	
PTX-0626	Meeting Request Cover Letter	LIQ_PH-ILD_00134042	LIQ_PH-ILD_00134042	
PTX-0627	2020-03-12 Email from Hans Airee to G. Bottorff re FYI	UTC_LIQ00077885	UTC_LIQ00077886	403, FN, H, R
PTX-0628	Spreadsheet: HCP Calls	UTC_LIQ00077893	UTC_LIQ00077893	403, FN, H, R
PTX-0629	2020-04-09 Email from G. Bottorff re IDL-PH sales force size and structure survey	UTC_LIQ00078069	UTC_LIQ00078073	403, FN, H, R
PTX-0630	2020-04-14 Email from G. Bottorff re thoughts on first 5 IDL qual interviews	UTC_LIQ00078118	UTC_LIQ00078118	403, FN, H, R
PTX-0631	2020-04-30 Email from J. Free to G. Bottorff re Framework for tomorrow's discussion	UTC_LIQ00199658	UTC_LIQ00199663	403, FN, H, R
PTX-0632	UBS BioPharma Conference Edited Transcript	UTC_PH-ILD_005044	UTC_PH-ILD_005051	403, FN, H, R, IO
PTX-0633	United Therapeutics Corp at JPMorgan Healthcare Conference Edited Brief	UTC_PH-ILD_005052	UTC_PH-ILD_005058	403, FN, H, R
PTX-0634	2023-12-20 TD Cowen Report	UTC_PH-ILD_005188	UTC_PH-ILD_005194	403, FN, H, R
PTX-0635	2024 UTC Form 10-K	UTC_PH-ILD_007552	UTC_PH-ILD_007682	403, R
PTX-0636	2023-06-30 UTC Form 10-Q	UTC_PH-ILD_007683	UTC_PH-ILD_007739	403, R
PTX-0637	2023-10-09 Wedbush Report	UTC_PH-ILD_008820	UTC_PH-ILD_008840	403, H, R

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PTX-0638	Lettieri 2006	UTC_PH-ILD_020775	UTC_PH-ILD_020783	H, R
PTX-0639	W20 Proposal	UTC_PH-ILD_114943	UTC_PH-ILD_114981	H, R, BE
PTX-0640	January 2021 Tyvaso Increase Trial Results	UTC_PH-ILD_121148	UTC_PH-ILD_121197	403, FN, H, R
PTX-0641	Intentionally Left Blank			
PTX-0642	Managed Markets Strategic Operations - Tyvaso DPI Contracting Strategy	UTC_PH-ILD_214632	UTC_PH-ILD_214633	403, H, R
PTX-0643	DRAFT: Managed Markets Strategic Operations - Tyvaso DPI Contracting Strategy	UTC_PH-ILD_214639	UTC_PH-ILD_214642	403, H, R
PTX-0644	Managed Markets Strategic Operations - Tyvaso DPI Contracting Strategy	UTC_PH-ILD_214643	UTC_PH-ILD_214645	403, H, R
PTX-0645	Spreadsheet: 2023-12-31 Financials Consolidated Balance Sheet	UTC_PH-ILD_214735	UTC_PH-ILD_214735	403, H, R
PTX-0646	Cost of Sales - Summary - Q3 2023	UTC_PH-ILD_214737	UTC_PH-ILD_214737	403, H, R
PTX-0647	Cost of Sales - Other Products - Q2 2024	UTC_PH-ILD_214742	UTC_PH-ILD_214745	403, H, R
PTX-0648	Cost of Sales - Other Products - Q2 2023	UTC_PH-ILD_214746	UTC_PH-ILD_214749	403, H, R
PTX-0649	Cost of Sales - Other Products - Q4 2023	UTC_PH-ILD_214750	UTC_PH-ILD_214753	403, H, R
PTX-0650	R&D Expenses	UTC_PH-ILD_214754	UTC_PH-ILD_214754	403, H, R
PTX-0651	Spreadsheet: Q1 22 RD Flux Analysis - MDA Meeting	UTC_PH-ILD_214755	UTC_PH-ILD_214755	403, H, R
PTX-0652	Q2 2021_RD Flux Analysis CONFIDENTIAL	UTC_PH-ILD_214756	UTC_PH-ILD_214756	403, H, R
PTX-0653	Q3 RD Flux Analysis Handout for MDA Meeting	UTC_PH-ILD_214757	UTC_PH-ILD_214757	403, H, R
PTX-0654	Q4 2021 RD Flux Analysis - MDA Handout	UTC_PH-ILD_214758	UTC_PH-ILD_214758	403, H, R
PTX-0655	Spreadsheet: 3.31.2023 Financials - Snapshot 4.24.2023	UTC_PH-ILD_214759	UTC_PH-ILD_214759	403, H, R
PTX-0656	Spreadsheet: 3.31.2024 Financials - Snapshot 4.18.2024	UTC_PH-ILD_214760	UTC_PH-ILD_214760	403, H, R
PTX-0657	Spreadsheet: 6.30.2023 Financials - Snapshot 7.18.202	UTC_PH-ILD_214761	UTC_PH-ILD_214761	403, H, R
PTX-0658	Spreadsheet: 6.30.2024 Financials - Snapshot 7.18.2024	UTC_PH-ILD_214762	UTC_PH-ILD_214762	403, H, R
PTX-0659	Spreadsheet: 9.30.2023 Financials	UTC_PH-ILD_214763	UTC_PH-ILD_214763	403, H, R
PTX-0660	Revenue Package Q1 2023	UTC_PH-ILD_214809	UTC_PH-ILD_214827	403, H, R
PTX-0661	Revenue Package Q2 2023	UTC_PH-ILD_214828	UTC_PH-ILD_214847	403, H, R
PTX-0662	Thabane 2013	UTC_PH-ILD_227534	UTC_PH-ILD_227545	403, H, R
PTX-0663	Amended Proposed Label	LIQ_PH-ILD_00091129	LIQ_PH-ILD_00091143	403, BE, C, FN, R
PTX-0664	Beth Goldstein, Sci Pol'y Analyst, U.S. Food & Drug Admin., Overview of the 505(b)(2) Regulatory Pathway for New Drug Applications	UTC_PH-ILD_227379	UTC_PH-ILD_227393	FN, H, R
PTX-0665	FDA GFI 2001 Statistical Approaches to Establishing BE	UTC_PH-ILD_227453	UTC_PH-ILD_227500	FN, H, R
PTX-0666	FDA Draft GFI 2022 Statistical Approaches to Establishing BE	UTC_PH-ILD_227501	UTC_PH-ILD_227533	FN, H, R
PTX-0667	FDA's Labeling Resources for Human Prescription Drugs FDA (7-Feb-2025)	UTC_PH-ILD_227394	UTC_PH-ILD_227400	FN, H, R
PTX-0668	IND 129819 Application	LIQ_PH-ILD_00022883	LIQ_PH-ILD_00022886	
PTX-0669	IND 129819 SN0001 Cover Letter	LIQ_PH-ILD_00022878	LIQ_PH-ILD_00022882	
PTX-0670	June 6, 2017 Correspondence	LIQ_PH-ILD_00046141	LIQ_PH-ILD_00046155	
PTX-0671	May 11, 2017 Correspondence	LIQ_PH-ILD_00046101	LIQ_PH-ILD_00046113	
PTX-0672	National Cancer Institute 2025 Hazard Ratio	UTC_PH-ILD_227452	UTC_PH-ILD_227452	R
PTX-0673	Original NDA 213005 § 2.7.1	LIQ_PH-ILD_00045396	LIQ_PH-ILD_00045453	
PTX-0674	Original NDA 213005 § 3.2.P.4.6	LIQ_PH-ILD_00062236	LIQ_PH-ILD_00062244	
PTX-0675	Pre-IND meeting	LIQ_PH-ILD_00046114	LIQ_PH-ILD_00046140	
PTX-0676	Pre-NDA meeting	LIQ_PH-ILD_00046156	LIQ_PH-ILD_00046174	
PTX-0677	U.S. Food & Drug Admin., Determining Whether to Submit an ANDA or a 505(b)(2) Application: Guidance for Industry (2019)	UTC_PH-ILD_227401	UTC_PH-ILD_227417	403, FN, H, R
PTX-0678	U.S. Food & Drug Admin., Guidance for Industry: Applications Covered by Section 505(b)(2): Draft Guidance (1999)	UTC_PH-ILD_227310	UTC_PH-ILD_227324	403, FN, H, R
PTX-0679	U.S. Food & Drug Admin., Guidance for Industry: Bioavailability and Bioequivalence Studies Submitted in NDAs or INDs – General Considerations: Draft Guidance (2014)	UTC_PH-ILD_227325	UTC_PH-ILD_227353	403, FN, H, R
PTX-0680	U.S. Food & Drug Admin., Guidance for Industry: Clinical Studies Section of Labeling for Human Prescription Drug and Biological Products – Content and Format (2006)	UTC_PH-ILD_227354	UTC_PH-ILD_227378	403, FN, H, R
PTX-0681	U.S. Food & Drug Admin., Guidance for Industry: Labeling for Human Prescription Drug and Biological Products – Implementing the PLR Content and Format Requirements (2013)	UTC_PH-ILD_227418	UTC_PH-ILD_227451	403, FN, H, R
PTX-0682	Intentionally Left Blank			

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0683	FDA IND 129819 Written Responses	LIQ_PH-ILD_00148510	LIQ_PH-ILD_00148518	
PTX-0684	2.7.3 Summary of Clinical Efficacy	LIQ_PH-ILD_00045361	LIQ_PH-ILD_00045395	
PTX-0685	2.7.2 Summary of Clinical Pharmacology Studies	LIQ_PH-ILD_00045335	LIQ_PH-ILD_00045360	
PTX-0686	2.7.4 Summary of Clinical Safety	LIQ_PH-ILD_00045455	LIQ_PH-ILD_00045497	
PTX-0687	2.7.6 Synopses of Individual Studies	LIQ_PH-ILD_00045454	LIQ_PH-ILD_00045454	
PTX-0688	International Patent Publication No. WO2014/085813			R
PTX-0689	Flolan® (epoprostenol) Prescribing Information (2000)	UTC_PH-ILD_220302	UTC_PH-ILD_220330	R
PTX-0690	Tracleer® (bosentan) Prescribing Information (2001)	UTC_PH-ILD_221377	UTC_PH-ILD_221378	R
PTX-0691	Remodulin® (treprostinil) Prescribing Information (2002)	UTC_PH-ILD_221170	UTC_PH-ILD_221182	R
PTX-0692	Ventavis® (iloprost) Prescribing Information (2004)	UTC_PH-ILD_221502	UTC_PH-ILD_221516	R
PTX-0693	Revatio® (sildenafil) Prescribing Information (2005)	UTC_PH-ILD_221189	UTC_PH-ILD_221201	R
PTX-0694	Adcirca® (tadalafil) Prescribing Information (2009)	UTC_PH-ILD_219988	UTC_PH-ILD_220005	R
PTX-0695	Intentionally Left Blank			
PTX-0696	Veletri® (epoprostenol) Prescribing Information (2010)	UTC_PH-ILD_221480	UTC_PH-ILD_221501	R
PTX-0697	Adempas® (riociguat) Prescribing Information (2013)	UTC_PH-ILD_220006	UTC_PH-ILD_220033	R
PTX-0698	Opsumit® (macitentan) Prescribing Information (2013)	UTC_PH-ILD_221017	UTC_PH-ILD_221038	R
PTX-0699	Orenitram® (treprostinil) Prescribing Information (2013)	UTC_PH-ILD_221039	UTC_PH-ILD_221059	R
PTX-0700	Letairis® (ambresentan) Prescribing Information (2015)	UTC_LIQ00021893	UTC_LIQ00021920	R
PTX-0701	Uptravi® (selexepag) Prescribing Information (2015)	UTC_PH-ILD_221459	UTC_PH-ILD_221479	R
PTX-0702	Intentionally Left Blank			
PTX-0703	INCREASE Clinical Trial, Study Revision Version 24 (March 3, 2017), https://clinicaltrials.gov/study/NCT02630316?tab=history&a=24#version-content-panel .	UTC_PH-ILD_220651	UTC_PH-ILD_220692	403, A, FN, H, R, BE
PTX-0704	INCREASE Clinical Trial, Study Revision Version 73 (April 1, 2019), https://clinicaltrials.gov/study/NCT02630316?tab=history&a=73#version-content-panel .	UTC_PH-ILD_220693	UTC_PH-ILD_220748	403, A, FN, H, R, BE
PTX-0705	NCT03185364 Clinical Trial (June 14, 2017), https://clinicaltrials.gov/study/NCT03185364?term=NCT03185364&rank=1	UTC_PH-ILD_219967	UTC_PH-ILD_219974	403, A, FN, H, R, BE
PTX-0706	NCT00705133 Clinical Trial (Sept. 9, 2020), https://clinicaltrials.gov/study/NCT00705133?cond=NCT00705133&rank=1	UTC_PH-ILD_219977	UTC_PH-ILD_219987	403, A, FN, H, R, BE
PTX-0707	NCT00705133 Clinical Trial (Sept. 9, 2020), Record History, https://clinicaltrials.gov/study/NCT00705133?cond=NCT00705133&rank=1 &tab=history	UTC_PH-ILD_219975	UTC_PH-ILD_219976	403, A, FN, H, R, BE
PTX-0708	Intentionally Left Blank			
PTX-0709	Arlettaz A, et al., Effects of Short-Term Prednisolone Intake During Submaximal Exercise. 39(9) Med. Sci. Sports Exerc. 1672 (2017).	UTC_PH-ILD_220034	UTC_PH-ILD_220040	H, R
PTX-0710	Azuma A., Double-Blind, Placebo-Controlled Trial of Pirfenidone in Patients With Idiopathic Pulmonary Fibrosis, 171(9) Am. J. Respir. Crit. Care Med 1040 (2005).	UTC_PH-ILD_220041	UTC_PH-ILD_220048	H, R
PTX-0711	Balady G.J. et al., Clinician's Guide To Cardiopulmonary Exercise Testing in Adults: A Scientific Statement from the American Heart Association, 122(2) Circulation 191 (2010).	UTC_PH-ILD_220049	UTC_PH-ILD_220083	H, R
PTX-0712	Barst R.J. et al., A Comparison of Continuous Intravenous Epoprostenol (Prostacyclin) with Conventional Therapy for Primary Pulmonary Hypertension. 334(5) N. Engl. J. Med. 296 (1996).	UTC_PH-ILD_220084	UTC_PH-ILD_220089	H, R
PTX-0713	Blanco, I., et al., Sildenafil to improve respiratory rehabilitation outcomes in COPD: a controlled trial, 42(4) Eur Respir J. 982 (2013).	UTC_PH-ILD_220090	UTC_PH-ILD_220100	H, R
PTX-0714	Brown A.W. and Nathan S.D., The Value and Application of the 6-Minute- Walk Test in Idiopathic Pulmonary Fibrosis, 15(1) Ann. Am. Thorac. Soc. 3 (2018).	UTC_PH-ILD_220101	UTC_PH-ILD_220108	H, R
PTX-0715	American Cancer Society, Cancer Facts & Figures 2025, https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2025/2025-cancer-facts-and-figures-acs (last visited Jan. 22, 2025).	UTC_PH-ILD_220109	UTC_PH-ILD_220156	403, A, FN, H, R, BE

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0716	Carter R. et al., Predicting Oxygen Uptake for Men and Women with Moderate to Severe Chronic Obstructive Pulmonary Disease, 84(8) Arch. Phys. Med. Rehabil. 1158 (2003).	UTC_PH-ILD_220157	UTC_PH-ILD_220163	H, R
PTX-0717	Chauvat A. et al., Severe Pulmonary Hypertension and Chronic Obstructive Pulmonary Disease. 172 Am. J. Respir. Crit. Care Med. 189 (2005).	UTC_PH-ILD_220164	UTC_PH-ILD_220169	H, R
PTX-0718	Chartier M. et al., Large-Scale Detection of Dug Off-Tagets: Hypotheses for Drug Repurposing and Understanding Side-Effects, 18 B.M.C. Pharmacology and Toxicology 18 (2017).	UTC_PH-ILD_220170	UTC_PH-ILD_220185	H, R
PTX-0719	Collard H.R. et al., Acute Exacerbation of Idiopathic Pulmonary Fibrosis. An International Working Group Report. 194(3) Am. J. Respir. Crit. Care Med. 265 (2016).	UTC_PH-ILD_220192	UTC_PH-ILD_220202	H, R
PTX-0720	Corte T.J. et al., Bosentan in pulmonary hypertension associated with fibrotic idiopathic interstitial pneumonia, 190(2) Am. J. Respir. Crit. Care Med. (2014).	UTC_PH-ILD_220203	UTC_PH-ILD_220212	H, R
PTX-0721	Cottin V. et al., Presentation, Diagnosis and Clinical Course of the Spectrum of Progressive-Fibrosing Interstitial Lung Diseases, 27(150) Eur. Respir. Rev. 180076 (2018).	UTC_PH-ILD_220213	UTC_PH-ILD_220223	H, R
PTX-0722	Demedts M. et al., High-Dose Acetylcysteine in Idiopathic Pulmonary Fibrosis, 353(21) N. Engl. J. Med. 2229 (2005).	UTC_PH-ILD_220224	UTC_PH-ILD_220237	H, R
PTX-0723	du Bois R et al., Six-Minute-Walk Test in Idiopathic Fibrosis, 183(9) Am J Respir Crit Care Med 1231 (2010).	UTC_PH-ILD_221604	UTC_PH-ILD_221610	R, 403, H
PTX-0724	du Bois R.M. et al., Forced Vital Capacity in Patients With Idiopathic Pulmonary Fibrosis: Test Properties and Minimal Clinically Important Difference. 184(12) Am. J. Respir. Crit. Care 1382 (2011).	UTC_PH-ILD_221611	UTC_PH-ILD_221618	R, 403, H
PTX-0725	Ebina M. et al., Heterogeneous Increase in CD34-Positive Alveolar Capillaries in Idiopathic Pulmonary Fibrosis. 169(11) Am. J. Respir. Crit. Care Med. 1203 (2004).	UTC_PH-ILD_220238	UTC_PH-ILD_220243	H, R
PTX-0726	Egan T.M. et al., Development of the New Lung Allocation System in the United States. 6(5 Pt 2) Am. J. Transplant. 1212 (2006).	UTC_PH-ILD_220244	UTC_PH-ILD_220259	H, R
PTX-0727	Farber H.W. et al., Predicting Outcomes in Pulmonary Arterial Hypertension Based on the 6-Minute Walk Distance. 34 J. Heart Lung Transplant 362 (2015).	UTC_PH-ILD_220260	UTC_PH-ILD_220266	H, R
PTX-0728	Faria-Urbina et al., Inhaled Treprostinil in Pulmonary Hypertension Associated with Lung Disease, 196(2) Lung 139 (2018).	UTC_PH-ILD_220267	UTC_PH-ILD_220278	C, BE
PTX-0729	Fell C.D. et al., The Prognostic Value of Cardiopulmonary Exercise Testing in Idiopathic Pulmonary Fibrosis, 179(5) Am. J. Respir. Crit. Care Med 402, 403 (2009).	UTC_PH-ILD_220279	UTC_PH-ILD_220284	R, 403, H
PTX-0730	Alfred P. Fishman, Clinical Classification of Pulmonary Hypertension, 22(3) Clinics in Chest Medicine 385 (2001).	UTC_PH-ILD_220285	UTC_PH-ILD_220291	H, R
PTX-0731	Flaherty K. et al., Nintedanib in Progressive Fibrosing Interstitial Lung Diseases, 381(18) N Engl J Med. (2019).	UTC_PH-ILD_220292	UTC_PH-ILD_220301	H, R
PTX-0732	Galie N. et al., Guidelines For the Diagnosis and Treatment of Pulmonary Hypertension: the Task Force For the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS), Endorsed By the International Society of Heart and Lung Transplantation (ISHLT), 30(20) Eur. Heart J.	UTC_PH-ILD_220342	UTC_PH-ILD_220386	H, R
PTX-0733	Galiè N. et al., 2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension: the Joint Task Force for the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS): endorsed by: Association for European Paediatric and Congenital Cardiology (AEPC), International Society for Heart and Lung Transplantation (ISHLT), 46(4) Eur. Respir. J (2015).	UTC_PH-ILD_220387	UTC_PH-ILD_220444	H, R
PTX-0734	Gall H. et al., The Giessen Pulmonary Hypertension Registry: Survival In Pulmonary Hypertension Subgroups, 36(9) J. Heart Lung Transplant 957 (2017).	UTC_PH-ILD_220450	UTC_PH-ILD_220460	H, R
PTX-0735	Garg V. et al., Mechanistic Insights Regarding The Role Of SGLT2 Inhibitors and GLP1 Agonist Drugs on Cardiovascular Disease In Diabetes, 62(4) Progress in Cardiovascular Diseases, 349 (2019).	UTC_PH-ILD_220461	UTC_PH-ILD_220469	H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0736	Glassberg M.K., Effect of pirfenidone on breathlessness in patients with idiopathic pulmonary fibrosis 54(3) Eur. Respir. J. 1900399 (2019).	UTC_PH-ILD_220470	UTC_PH-ILD_220473	H, R
PTX-0737	Graham B.L. et al., 2017 ERS/ATS Standards for Single-Breath Carbon Monoxide Uptake in the Lung, 490 Eur. Respir. J. 1600016 (2017).	UTC_PH-ILD_220482	UTC_PH-ILD_220512	H, R
PTX-0738	Graham B.L. et al., Standardization of Spirometry 2019 Update. An Official American Thoracic Society and European Respiratory Society Technical Statement. 200 Am J Respir Crit Care Med. e70 (2019).	UTC_PH-ILD_220513	UTC_PH-ILD_220531	H, R
PTX-0739	Goudie A. et al., Tadalafil in patients with chronic obstructive pulmonary disease: a randomized, double-blind, parallel-group, placebo-controlled trial, (2) Lancet Respir Med (2014).	UTC_PH-ILD_220474	UTC_PH-ILD_220481	H, R
PTX-0740	Guazzi M. et al., Cardiopulmonary Exercise Testing: What Is its Value?, 70(13) J. Am. Coll. Cardiol. 1618 (2017).	UTC_PH-ILD_220532	UTC_PH-ILD_220550	H, R
PTX-0741	Hallowell R.W. et al., Severe Pulmonary Hypertension in Idiopathic Nonspecific Interstitial Pneumonia. 2(1) Pulm. Circ. 101 (2012).	UTC_PH-ILD_220551	UTC_PH-ILD_220556	H, R
PTX-0742	Hamada K. et al., Significance of Pulmonary Arterial Pressure and Diffusion Capacity of the Lung as Prognosticator in Patients with Idiopathic Pulmonary Fibrosis, 131(3) Chest 650 (2007).	UTC_PH-ILD_220557	UTC_PH-ILD_220563	R, 403, H
PTX-0743	Han M. et al., Sildenafil Preserves Exercise Capacity in Patients With Idiopathic Pulmonary Fibrosis and Right-sided Ventricular Dysfunction, 143(6) Chest (2013).	UTC_PH-ILD_220564	UTC_PH-ILD_220573	R, 403, H
PTX-0744	Harari S., RISE-IIP: Some Pitfalls and Observations, 7(11) Lancet Respir Med. E35 (2019).	UTC_PH-ILD_220574	UTC_PH-ILD_220574	R, H
PTX-0745	Hooper M.M. et al., Riociguat for interstitial lung disease and pulmonary hypertension: a pilot trial, 41 Eur. Respir. J. (2013).	UTC_PH-ILD_220575	UTC_PH-ILD_220583	R, H
PTX-0746	Hooper M.M. et al., Pulmonary Hypertension in Patients with Chronic Fibrosing Idiopathic Interstitial Pneumonias 10(12) PLoS One e0141911 (2015).	UTC_PH-ILD_220584	UTC_PH-ILD_220596	R, H
PTX-0747	Hooper M.M. et al., A Global View of Pulmonary Hypertension, 4(4) Lancet Respir. Med. 306 (2016).	UTC_PH-ILD_220597	UTC_PH-ILD_220613	R, H
PTX-0748	Anne E Holland et al., An official European Respiratory Society/American Thoracic Society technical standard: field walking tests in chronic respiratory disease, 44(6) Eur. Respir. J (2014).	UTC_PH-ILD_057748	UTC_PH-ILD_057766	R, H
PTX-0749	Humbert M. et al., Cellular and Molecular Pathobiology of Pulmonary Arterial Hypertension. 43(12_Supplement) J.A.C.C. S13 (2004).	UTC_PH-ILD_220614	UTC_PH-ILD_220625	R, H
PTX-0750	Humbert M. et al., Pathology and Pathobiology of Pulmonary Hypertension: State of the Art and Research Perspectives, 53 Eur. Respir. J. 1801887 (2019).	UTC_PH-ILD_220626	UTC_PH-ILD_220639	R, H
PTX-0751	Hunninghake G.W., Antioxidant Therapy For Idiopathic Pulmonary Fibrosis, 353(21) N. Engl. J. Med. 2285 (2005).	UTC_PH-ILD_220640	UTC_PH-ILD_220642	R, H
PTX-0752	Hwang T.J. et al., Failure of Investigational Drugs in Late-Stage Clinical Development and Publication of Trial Results, 176(12) J. Am. Med. Assoc. Intern. Med. 1826 (2016).	UTC_PH-ILD_220643	UTC_PH-ILD_220650	R, 403, H
PTX-0753	American Thoracic Society et al., This Joint Statement of the American Thoracic Society (ATS), and the European Respiratory Society (ERS) was Adopted by the ATS Board of Directors, 165(2) Am. J. Respir. Crit. Care Med. 277 (2002).	UTC_PH-ILD_220749	UTC_PH-ILD_220776	R, H
PTX-0754	Jonigk D. et al., Plexiform Lesions in Pulmonary Arterial Hypertension Composition, Architecture, and Microenvironment, 179(1) Am. J. Pathol. 167 (2011).	UTC_PH-ILD_220777	UTC_PH-ILD_220789	R, H
PTX-0755	Kahan B.C. & Jairath V., Outcome Pre-Specification Requires Sufficient Detail To Guard Against Outcome Switching in Clinical Trials: A Case Study 19(1) Trials 265 (2018).	UTC_PH-ILD_220790	UTC_PH-ILD_220794	R, H
PTX-0756	Kimura M. et al., Pulmonary Hypertension as a Prognostic Indicator at the Initial Evaluation in Idiopathic Pulmonary Fibrosis. 85 Respiration 456 (2013).	UTC_PH-ILD_220795	UTC_PH-ILD_220802	R, H
PTX-0757	King T.E. Jr. et al., BUILD-1: A Randomized Placebo-Controlled Trial of Bosentan in Idiopathic Pulmonary Fibrosis 177(1) Am. J. Respir. Crit. Care Med. 75 (2008).	UTC_PH-ILD_220803	UTC_PH-ILD_220809	R, H

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0758	King T.E. Jr., et al., BUILD-3: A Randomized, Controlled Trial of Bosentan in Idiopathic Pulmonary Fibrosis, 184(1) Am. J. Respir. Crit. Care Med 92 (2011)	UTC_PH-ILD_220810	UTC_PH-ILD_220817	R, H
PTX-0759	King T.E. Jr., A phase 3 trial of pirfenidone in patients with idiopathic pulmonary fibrosis, 370(22) N Engl J Med. (2014).	UTC_PH-ILD_220818	UTC_PH-ILD_220827	R, H
PTX-0760	Kolb M. et al. Nintedanib plus Sildenafil in Patients with Idiopathic Pulmonary Fibrosis, 379(18) N Engl J Med. (2018).	UTC_PH-ILD_220836	UTC_PH-ILD_220845	R, 403, H
PTX-0761	Kolte D., et al., Mild Pulmonary Hypertension Is Associated With Increased Mortality: A Systematic Review and Meta-Analysis, 7(18) J. Am. Heart Assoc. e009729 (2018).	UTC_PH-ILD_220846	UTC_PH-ILD_220858	R, 403, H
PTX-0762	Krauss E. et al., Assessing the Effectiveness of Pirfenidone in Idiopathic Pulmonary Fibrosis: Long-Term, Real-World Data from European IPF Registry (eurIPFreg), 9(11) J. Clin. Med. 3763 (2020).	UTC_PH-ILD_220859	UTC_PH-ILD_220877	R, 403, H
PTX-0763	Lettieri C.J., et al., Prevalence and outcomes of pulmonary arterial hypertension in advanced idiopathic pulmonary fibrosis, 129(3) Chest 746 (2006).	UTC_PH-ILD_220878	UTC_PH-ILD_220884	R, 403, H
PTX-0764	Maher T. et al., Pirfenidone in patients with unclassifiable progressive fibrosing interstitial lung disease: a double-blind, randomised, placebo-controlled, phase 2 trial, 8(2) Lancet Respir Med. (2020).	UTC_PH-ILD_220885	UTC_PH-ILD_220895	R, 403, H
PTX-0765	Maron B.A. & Ryan J.J., A Concerning Trend for Patients with Pulmonary Hypertension in the Era of Evidence-Based Medicine, 139(16) 1861 (2019).	UTC_PH-ILD_220896	UTC_PH-ILD_220899	R, H
PTX-0766	Martinez F.J. et al., Randomized Trial of Acetylcysteine in Idiopathic Pulmonary Fibrosis, 370(22) N. Engl. J. Med. 2093 (2014).	UTC_PH-ILD_220900	UTC_PH-ILD_220908	R, H
PTX-0767	McLaughlin, V.V. et al., Addition of inhaled treprostinil to oral therapy for pulmonary arterial hypertension: a randomized controlled clinical trial, 55(18) J. Am. Coll. Cardiol. 1915 (2010).	UTC_PH-ILD_220909	UTC_PH-ILD_220916	R, H
PTX-0768	Meyer K.C., Pulmonary Hypertension Associated With Idiopathic Interstitial Pneumonia: Is Effective Pharmacotherapy An Impossible Dream? 7(9) Lancet Respir. Med. 727 (2019).	UTC_PH-ILD_220917	UTC_PH-ILD_220918	R, H
PTX-0769	Moua T. et al., Patients With Fibrotic Interstitial Lung Disease Hospitalized for Acute Respiratory Worsening: A Large Cohort Analysis, 149(5) Chest 1205 (2016).	UTC_PH-ILD_220919	UTC_PH-ILD_220928	R, H
PTX-0770	Nathan S et al., Validation of Test Performance Characteristics and Minimal Clinically Important Difference of the 6-Minute Walk Test in Patients with Idiopathic Pulmonary Fibrosis, 109(7) Respir. Med. 914 (2015).	UTC_PH-ILD_220929	UTC_PH-ILD_220937	R, H
PTX-0771	Nathan S.D. et al., Riociguat for idiopathic interstitial pneumonia-associated pulmonary hypertension (RISE-IIP): a randomised, placebo-controlled phase 2b study, 7(9) Lancet Respir Med. (2019).	UTC_PH-ILD_220953	UTC_PH-ILD_220963	R, H
PTX-0772	Nathan S et al., Inhaled Treprostinil and Forced Vital Capacity in Patients with Interstitial Lung Disease and Associated Pulmonary Hypertension: A Post-hoc Analysis of the INCREASE Study, (9) Lancet Respir Med (2021).	UTC_PH-ILD_220964	UTC_PH-ILD_220972	R, H
PTX-0773	Nathan S.D. et al., Study design and rationale for the TETON phase 3, randomised, controlled clinical trials of inhaled treprostinil in the treatment of idiopathic pulmonary fibrosis, 9(1) BMJ Open Respir Res (2022).	UTC_PH-ILD_220973	UTC_PH-ILD_220978	R, H
PTX-0774	Nishiyama O. et al., Pulmonary Hemodynamics and Six-Minute Walk Test Outcomes in Patients with Interstitial Lung Disease, Can. Respir. J. (2016).	UTC_PH-ILD_220979	UTC_PH-ILD_220985	R, H, 403
PTX-0775	Noble P.W. et al., Pirfenidone in Patients with Idiopathic Pulmonary Fibrosis (CAPACITY): Two Randomised Trials, 377 Lancet 1760 (2011).	UTC_PH-ILD_220986	UTC_PH-ILD_220995	R, H, 403
PTX-0776	Oldham W.M. et al., Network Analysis to Risk Stratify Patients with Exercise Intolerance, 122(6) Circ. Res. 864 (2018).	UTC_PH-ILD_220996	UTC_PH-ILD_221008	R, H, 403
PTX-0777	Olschewski H. et al., Inhaled Prostacyclin and Iloprost in Severe Pulmonary Hypertension Secondary To Lung Fibrosis 160(2) Am. J. Respir. Crit. Care Med. 600 (1999).	UTC_PH-ILD_221009	UTC_PH-ILD_221016	R, 403, H

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0778	Opotowsky A. et al., Thermodilution vs Estimated Fick Cardiac Output Measurement in Clinical Practice: An Analysis of Mortality From the Veterans Affairs Clinical Assessment, Reporting, and Tracking (VA CART) Program and Vanderbilt University, 2(10) JAMA Cardiol. (2017).	UTC_PH-ILD_221625	UTC_PH-ILD_221634	R, H
PTX-0779	Intentionally Left Blank			
PTX-0780	Pastré J. et al., Determinants of exercise capacity in cystic fibrosis patients with mild-to-moderate lung disease, B.M.C. Pulm. Med. 14, 74 (2014).	UTC_PH-ILD_221060	UTC_PH-ILD_221067	R, 403, H
PTX-0781	Peikert T. et al., Assessment of Current Practice in the Diagnosis and Therapy of Idiopathic Pulmonary Fibrosis, 102 Respir Med 1342 (2008).	UTC_PH-ILD_221068	UTC_PH-ILD_221074	R, H
PTX-0782	Pellegrino R. et al., Interpretative Strategies for Lung Function Tests, 26 Eur Respir J. 948 (2005).	UTC_PH-ILD_221075	UTC_PH-ILD_221095	R, H
PTX-0783	Prins K.W. et al., Chronic Use of PAH-Specific Therapy in World Health Organization Group III Pulmonary Hypertension: A Systematic Review and Meta-Analysis, 7(1) Pulm. Circ. 145 (2017).	UTC_PH-ILD_221096	UTC_PH-ILD_221106	R, H
PTX-0784	Raghu G. et al., Prednisone, Azathioprine, and N-Acetylcysteine For Pulmonary Fibrosis, 366(21) N. Engl. J. Med. 1968 (2012).	UTC_PH-ILD_221107	UTC_PH-ILD_221116	R, 403, H
PTX-0785	Intentionally Left Blank			
PTX-0786	Raghu G. et al., Macitentan For the Treatment of Idiopathic Pulmonary Fibrosis: the Randomised Controlled MUSIC Trial, 42(6) Eur. Respir. J. 1622 (2013)	UTC_PH-ILD_221117	UTC_PH-ILD_221127	R, 403, H
PTX-0787	Raghu G. et al., Pulmonary Hypertension in Idiopathic Pulmonary Fibrosis with Mild to Moderate Restriction, 46 Eur. Respir. J. 1370 (2015).	UTC_PH-ILD_221128	UTC_PH-ILD_221135	R, 403, H
PTX-0788	Raghu G. et al., An Official ATS/ERS/JRS/ALAT Clinical Practice Guideline: Treatment of Idiopathic Pulmonary Fibrosis. An Update of the 2011 Clinical Practice Guideline, 192(2) Am. J. Respir. Crit. Care Med. e3 (2015).	UTC_PH-ILD_221136	UTC_PH-ILD_221152	R, 403, H
PTX-0789	Intentionally Left Blank			
PTX-0790	Rao R. et al., Sildenafil Improves Six-minute Walk Distance in Chronic Obstructive Pulmonary Disease: A Randomised, Double-blind, Placebo- controlled Trial, 53 Ind. J. Chest Dis. & Allied Sci. (2011).	UTC_PH-ILD_221164	UTC_PH-ILD_221169	R, 403, H
PTX-0791	Renzoni E.A. et al., Interstitial Vascularity in Fibrosing Alveolitis, 167(3) Am. J. Respir. Crit. Care Med. 438 (2003).	UTC_PH-ILD_221183	UTC_PH-ILD_221188	R, H
PTX-0792	Rich S., World Symposium, Primary Pulmonary Hypertension – Executive Summary (1998).	UTC_PH-ILD_221202	UTC_PH-ILD_221230	R, 403, H
PTX-0793	Richeldi L. et al., Efficacy of A Tyrosine Kinase Inhibitor in Idiopathic Pulmonary Fibrosis, 365(12) N. Engl. J Med. 1079 (2011).	UTC_PH-ILD_221231	UTC_PH-ILD_221239	R, 403, H
PTX-0794	Richeldi L. et al., Efficacy and Safety of Nintedanib in Idiopathic Pulmonary Fibrosis, 370(22) N Engl J Med. 2071 (2014).	UTC_PH-ILD_221240	UTC_PH-ILD_221251	R, 403, H
PTX-0795	Rose L. et al., Survival in Pulmonary Hypertension due to Chronic Lung Disease: Influence of Low Diffusion Capacity of the Lungs for Carbon Monoxide, 38(2) J. Heart & Lung Transpl. (2019).	UTC_PH-ILD_221252	UTC_PH-ILD_221262	R, H
PTX-0796	Rosenkranz S. & Preston I., Right heart catheterisation: best practice and pitfalls in pulmonary hypertension. 24(138) Eur Respir Rev. (2015).	UTC_PH-ILD_221263	UTC_PH-ILD_221273	R, H
PTX-0797	Roydhouse J.K., Fiero M.H. and Kluetz P.G., Investigating Potential Bias in Patient-Reported Outcomes in Open-label Cancer Trials, 5(4) J. Am. Med. Assoc. Oncol. 457 (2018).	UTC_PH-ILD_221274	UTC_PH-ILD_221275	R, 403, H
PTX-0798	Intentionally Left Blank			
PTX-0799	Intentionally Left Blank			
PTX-0800	Shorr A.F. et al., Pulmonary Hypertension in Patients with Pulmonary Fibrosis Awaiting Lung Transplant, 30 Eur. Respir. J. 715 (2007).	UTC_PH-ILD_221276	UTC_PH-ILD_221282	R, H
PTX-0801	Sally J. Singh et al., An Official Systematic Review of the European Respiratory Society/American Thoracic Society: Measurement Properties of Field Walking Tests in Chronic Respiratory Disease, 44(6) Eur Respir J. (2014).	LIQ_PH-ILD_00149546	LIQ_PH-ILD_00149577	R, 403, H
PTX-0802	Sitbon O. et al., Clinical Trial Design and New Therapies for Pulmonary Arterial Hypertension, 53(1) Eur. Respir. J. 1801908 (2019).	UTC_PH-ILD_221296	UTC_PH-ILD_221312	R, 403, H

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0803	Spagnolo P. & Maher T.M., Clinical trial research in focus: why do so many clinical trials fail in IPF?, 5(5) Lancet Respir. Med. 372 (2017).	UTC_PH-ILD_221313	UTC_PH-ILD_221315	R, 403, H
PTX-0804	Stenmark K.R. et al., Animal Models of Pulmonary Arterial Hypertension: the Hope for Etiological Discovery and Pharmacological Cure, 297(6) Am J Physiol Lung Cell Mol Physiol. L1013 (2009).	UTC_PH-ILD_221316	UTC_PH-ILD_221335	R, 403, H
PTX-0805	Swigris J.J., The 6 Minute Walk in Idiopathic Pulmonary Fibrosis: Longitudinal Changes and Minimum Important Difference, 65(2) Thorax 173 (2010).	UTC_PH-ILD_221336	UTC_PH-ILD_221340	R, 403, H
PTX-0806	Thenappan T. et al., Survival in Pulmonary Arterial Hypertension: A Reappraisal of the NIH Risk Stratification Equation, 35(5) Eur. Respir. J. 1079 (2010).	UTC_PH-ILD_221341	UTC_PH-ILD_221349	R, H
PTX-0807	Thenappan T. et al., Pulmonary Arterial Hypertension: Pathogenesis and Clinical Management, 360 B.M.J. j5492 (2018).	UTC_PH-ILD_221350	UTC_PH-ILD_221376	R, H
PTX-0808	Trammell A. W., et al., Use of Pulmonary Arterial Hypertension-Approved Therapy in The Treatment of Non-Group 1 Pulmonary Hypertension at US Referral Centers, 5(2) Pulm. Circ. (2015).	UTC_PH-ILD_221379	UTC_PH-ILD_221386	R, H, 403
PTX-0809	Travis W.D. et al., An Official American Thoracic Society/European Respiratory Society Statement: Update of the International Multidisciplinary Classification of the Idiopathic Interstitial Pneumonias. 188(6) Am. J. Respir. Crit. Care Med. 733 (2013).	UTC_PH-ILD_221387	UTC_PH-ILD_221402	R, H
PTX-0810	Tuder R.M. et al., Pathology of Pulmonary Hypertension, 28(1) Clin. Chest Med. 23 (2007).	UTC_PH-ILD_221403	UTC_PH-ILD_221422	R, H, C
PTX-0811	Tuder R.M., et al., Pathology of Pulmonary Hypertension 34(4) Clin. Chest Med. 639 (2013).	UTC_PH-ILD_221423	UTC_PH-ILD_221434	R, H, C
PTX-0812	Verma S. & McMurray J.V., The Serendipitous Story of SGLT2 Inhibitors in Heart Failure, 139(22) Circulation 2537 (2019).	UTC_PH-ILD_221517	UTC_PH-ILD_221521	R, H
PTX-0813	Vitulio P. et al., Sildenafil in Severe Pulmonary Hypertension Associated With Chronic Obstructive Pulmonary Disease: A Randomized Controlled Multicenter Clinical Trial, 36(2) J. Heart & Lung Transpl. (2017).	UTC_PH-ILD_221522	UTC_PH-ILD_221530	R, 403, H
PTX-0814	von Elm E., The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines For Reporting Observational Studies 61 J. Clin. Epidemi. (2008).	UTC_PH-ILD_221619	UTC_PH-ILD_221624	R, H
PTX-0815	Vonk Noordegraaf A., Westerhof B.E., Westerhof N., The Relationship Between the Right Ventricle and its Load in Pulmonary Hypertension, 69(2) J. Am. Coll. Cardiol. 236 (2017).	UTC_PH-ILD_221531	UTC_PH-ILD_221538	R, H
PTX-0816	Vonk Noordegraaf A. et al., Pathophysiology of the Right Ventricle and of the Pulmonary Circulation in Pulmonary Hypertension: An Update, 53 Eur. Respir. J. 1801900 (2019).	UTC_PH-ILD_221539	UTC_PH-ILD_221551	R, H
PTX-0817	Wallaert B. et al., Reduction of Maximal Oxygen Uptake in Sarcoidosis: Relationship with Disease Severity, 82(6) Respiration 501 (2011).	UTC_PH-ILD_221552	UTC_PH-ILD_221559	R, 403, H
PTX-0818	Wanger J. et al., Standardisation of the Measurement of Lung Volumes, 26 Eur. Resp. J. 511 (2005).	UTC_PH-ILD_221560	UTC_PH-ILD_221571	R, H
PTX-0819	Intentionally Left Blank			
PTX-0820	Intentionally Left Blank			
PTX-0821	Jason Weatherald et al., Cardiopulmonary Exercise Testing in Pulmonary Hypertension, 14 Supp. 1 Ann. Am. Thorac. Soc. S84 (2017).	UTC_PH-ILD_221572	UTC_PH-ILD_221580	R, H
PTX-0822	Wood L., et al., Empirical Evidence of Bias in Treatment Effect Estimates in Controlled Trials with Different Interventions and Outcomes: Meta- Epidemiological Study, 336(7644) B.M.J. 601 (2008).	UTC_PH-ILD_221581	UTC_PH-ILD_221588	R, H
PTX-0823	Zappala C.J. et al., Marginal Decline in Forced Vital Capacity Is Associated With A Poor Outcome in Idiopathic Pulmonary Fibrosis, 35(4) Eur. Respir. 363(7) N Engl Med 620 (2010).	UTC_PH-ILD_221589	UTC_PH-ILD_221594	R, H
PTX-0824	Zisman D. et al., A Controlled Trial of Sildenafil in Advanced Idiopathic Pulmonary Fibrosis, 363(7) N Engl Med 620 (2010).	UTC_PH-ILD_221595	UTC_PH-ILD_221603	R, H
PTX-0825	2024-05-09 Liquidia Claim Terms and Proposed Constructions			R, H
PTX-0826	2024-05-09 UTC Claim Terms and Proposed Constructions			R, H

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0827	2024-05-23 [094] Joint Claim Construction Chart w Exs. A-D			R, H
PTX-0828	2024-08-29 [123] [SEALED] Joint Claim Construction Brief			R, H
PTX-0829	2024-08-29 [124] [SEALED] Joint Appendix			R, H
PTX-0830	2024-08-29 [124] [SEALED] Ex. 01 - [SEALED] Liquidia's Invalidity Contentions 2024-06-03			
PTX-0831	2024-08-29 [124] [SEALED] Ex. 02 - '793 Trial Tr., Day 4 03-31-2022			R, 403, H, IC
PTX-0832	2024-08-29 [124] [SEALED] Ex. 03 - 2009 Tyvaso Label			R, 403, H
PTX-0833	2024-08-29 [124] [SEALED] Ex. 04 - 2004 Remodulin Label			R, 403, H
PTX-0834	2024-08-29 [124] [SEALED] Ex. 05 - Liquidia Corporate Overview (2022-06-20) (LIQ_PH-ILD_00000536)			R, 403
PTX-0835	2024-08-29 [124] [SEALED] Ex. 06 - Liquidia 2018 10-K (UTC_PH-ILD_003164)			R, 403
PTX-0836	2024-08-29 [124] [SEALED] Ex. 07 - Liquidia 2019 10-K (UTC_PH-ILD_003386)			R, 403
PTX-0837	2024-08-29 [124] [SEALED] Ex. 08 - YUTREPIA LABEL (LIQ_PH-ILD_00000896)			R, 403
PTX-0838	2024-08-29 [124] [SEALED] Ex. 09 - PI Hearing Tr. (2024-04-23) (excerpts)			R, H, 403, IC
PTX-0839	2024-08-29 [124] [SEALED] Ex. 10 - LIQ_PH-ILD_00001405 (Barst)			R, H
PTX-0840	2024-08-29 [124] [SEALED] Ex. 11 - LIQ_PH-ILD_00001682 (Lee)			R, H
PTX-0841	2024-08-29 [124] [SEALED] Ex. 12 - (US Patent App Pub 2008.0200449 - LIQ_PH-ILD_00101769)			R, H
PTX-0842	2024-08-29 [124] [SEALED] Ex. 13 - (US 9358240 - LIQ_PH-ILD_00101827)			R, H
PTX-0843	2024-08-29 [124] [SEALED] Ex. 14 - (US 9339507 - LIQ_PH-ILD_00101803)			R, H
PTX-0844	2024-08-29 [124] [SEALED] Ex. 15 - (US 10376525 - LIQ_PH-ILD_00101719)			R, H
PTX-0845	2024-08-29 [124] [SEALED] Ex. 16 - (US 10716793 - UTC_PH-ILD_009772)			R, H
PTX-0846	2024-08-29 [124] [SEALED] Ex. 17 - (Pulse - Merriam-Webster - LIQ_PH-ILD_00102183)			R, 403, H, F
PTX-0847	2024-08-29 [124] [SEALED] Ex. 18 - (Tyvaso Inhalation System Manual - LIQ_PH-ILD_00002547)			R, 403, H, IC
PTX-0848	2024-08-29 [124] [SEALED] Ex. 19 (Nathan Depo Tr. - LIQ_PH-ILD_00000677)			R, H
PTX-0849	2024-08-29 [124] [SEALED] Ex. 20 - (WO2017192993A1 - LIQ_PH-ILD_00102194)			R, H
PTX-0850	2024-08-29 [124] [SEALED] Ex. 21 - (WO2019237028A1 - LIQ_PH-ILD_00102338)			R, H
PTX-0851	2024-08-29 [124] [SEALED] Ex. 22 - [SEALED] 2024-07-16 Liquidia First Amended Invalidity Contentions			
PTX-0852	2024-08-29 [124] [SEALED] Ex. 23 - [SEALED] Channick Depo Tr.			R, H
PTX-0853	2024-08-29 [124] [SEALED] Ex. 24 - [SEALED] 2024-08-02 Liquidia response to UTC 7.17 RFP Letter			R, H, IC
PTX-0854	2024-08-29 [124] [SEALED] Ex. 25 - (US10786482)			R, 403
PTX-0855	2024-08-29 [124] [SEALED] Ex. 26 - (LIQ_PH-ILD_00002406)			R, 403, FN
PTX-0856	2024-08-29 [124] [SEALED] Ex. 27 - (LIQ_PH-ILD_00002935)			R, 403, FN
PTX-0857	2024-10-16 [149] Memorandum Opinion re Claim Construction Proposed Order			BRPL
PTX-0858	2024-10-18 [154] Proposed Claim Construction Order			R, 403, BE, H
PTX-0859	2024-10-04 [133] UTC Letter to Court regarding disputed 'a'-'the' term			R, 403, BE, H, IC
PTX-0860	2024-10-07 [134] LIQ Responsive Letter to Court re [133]			R, 403, IC
PTX-0861	2024-10-08 [135] Order to UTC re Submit Another Letter re 'a'-'the' term			R, 403, BE, H, BRPL
PTX-0862	2024-10-10 [139] UTC Ltr to Court re Response to Oct 8 Order			R, 403, H, IC
PTX-0863	2024-09-30 Markman Hearing Transcript			BRPL, H, R, IE
PTX-0864	2024-03-10 Nathan Steven Deposition Transcript			R, H, MIL
PTX-0865	2024-03-10 Steven Nathan Errata			R, H
PTX-0866	2024-03-15 Frederic Selck Deposition Transcript			R, H
PTX-0867	2024-03-15 Frederic Selck Errata			R, H
PTX-0868	2024-04-05 Douglas Kidder Deposition Transcript			R, H
PTX-0869	2024-04-06 Richard Channick Deposition Transcript			R, H
PTX-0870	2024-09-06 Kishan Parikh Deposition Transcript			R, H
PTX-0871	2024-09-17 Rajan Saggar Deposition Transcript			R, H
PTX-0872	2024-10-11 Mariana Faria-Urbina Deposition Transcript			R, H
PTX-0873	2024-10-15 Noah Byrd Deposition Transcript			R, H

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PTX-0874	2024-10-16 Rajeev Sagar Deposition Transcript			R, H
PTX-0875	2024-10-16 Rajeev Sagar Errata			R, H
PTX-0876	2024-10-23 Janet Tully Deposition Transcript			R, H
PTX-0877	2024-10-23 Janet Tully - Sorenson Errata			R, H
PTX-0878	2024-10-29 Dean Bunce Deposition Transcript			R, H
PTX-0879	2024-10-29 Dean Bunce Errata			R, H
PTX-0880	2024-10-31 Stephen Maebius Deposition Transcript			R, H
PTX-0881	2024-10-31 Stephen Maebius Errata			R, H
PTX-0882	2024-11-05 Brian Patterson Deposition Transcript			R, H
PTX-0883	2024-11-05 Brian Patterson Errata			R, H
PTX-0884	2024-11-05 Victor Tapson Deposition Transcript			R, H
PTX-0885	2024-11-05 Victor Tapson Errata			R, H
PTX-0886	2024-11-06 Leigh Peterson Deposition Transcript			R, H
PTX-0887	2024-11-06 Leigh Peterson Errata			R, H
PTX-0888	2024-11-08 Kevin Laliberte Deposition Transcript			R, H
PTX-0889	2024-11-08 Kevin Laliberte Errata			R, H
PTX-0890	2024-11-08 Michael Wade Deposition Transcript			R, H
PTX-0891	2024-11-08 Michael Wade Errata			R, H
PTX-0892	2024-11-12 Gregory Bottorff Deposition Transcript			R, H
PTX-0893	2024-11-12 Gregory Bottorff Errata			R, H
PTX-0894	2024-11-12 Chunqin Deng Deposition Transcript			R, H
PTX-0895	2024-11-12 Chunqin Deng Errata			R, H
PTX-0896	2024-11-13 Peter Smith Deposition Transcript			R, H
PTX-0897	2024-11-13 Peter Smith Errata			R, H
PTX-0898	2024-11-14 David Barton Deposition Transcript			R, H
PTX-0899	2024-11-14 David Barton Errata			R, H
PTX-0900	2024-11-15 Kiernan DeAngelis Deposition Transcript			R, H
PTX-0901	2024-11-15 Kiernan DeAngelis Errata			R, H
PTX-0902	2024-11-15 Vijay Nainani Deposition Transcript			R, H
PTX-0903	2024-11-15 Vijay Nainani Errata			R, H
PTX-0904	2024-11-20 Rajan Sagar Deposition Transcript			R, H
PTX-0905	2024-11-20 Rajan Sagar Errata			R, H
PTX-0906	2024-11-26 Shaun Snader Deposition Transcript			R, H
PTX-0907	2024-11-26 Shaun Snader Errata			R, H
PTX-0908	2024-12-03 Jason Adair Deposition Transcript			R, H
PTX-0909	2024-12-12 Aaron Waxman Deposition Transcript			R, H
PTX-0910	2024-12-12 Aaron Waxman Errata			R, H
PTX-0911	2025-03-11 Bradley Wertheim Deposition Transcript			R, H
PTX-0912	2025-03-11 Bradley Wertheim Errata			R, H
PTX-0913	2025-03-12 Nicholas Hill Deposition Transcript			R, H
PTX-0914	Intentionally Left Blank			
PTX-0915	2025-03-12 Frederic Selck Deposition Transcript			R, H
PTX-0916	2025-03-12 Frederic Selck Errata			R, H
PTX-0917	2025-03-14 Richard Channick Deposition Transcript			R, H
PTX-0918	Intentionally Left Blank			
PTX-0919	2025-03-14 Douglas Kidder Deposition Transcript			R, H
PTX-0920	2025-03-14 Douglas Kidder Errata			R, H
PTX-0921	2025-03-14 Ronald Thisted Deposition Transcript			R, H
PTX-0922	2025-03-14 Ronald Thisted Errata			R, H
PTX-0923	2025-03-20 Stephan Ogenstad Deposition Transcript			R, H
PTX-0924	Intentionally Left Blank			
PTX-0925	2025-03-28 Stephen Nathan Deposition Transcript			R, H
PTX-0926	Intentionally Left Blank			
PTX-0927	2025-04-11 Rajan Sagar Deposition Transcript			R, H

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0928	Intentionally Left Blank			
PTX-0929	2024-11-12 Liquidia Responses to UTC First Set of RFAs (Nos. 1-25)			
PTX-0930	2024-06-17 UTC Responses to Liquidia First Set of RFPs (Nos. 1-75)			H,R
PTX-0931	2024-06-27 Liquidia Responses to UTC First Set of RFPs (Nos. 1-17)			
PTX-0932	2024-08-23 Liquidia Responses to UTC Second Set of RFPs (Nos. 18-85)			
PTX-0933	2024-11-08 UTC Responses to Liquidia Second Set of RFPs (Nos. 76-79)			H,R
PTX-0934	2024-06-05 Liquidia Responses to UTC First Set of ROGs (No. 1)			
PTX-0935	2024-07-05 UTC Responses to Liquidia First Set of ROGs (Nos. 1-6)			H,R
PTX-0936	2024-09-20 Liquidia Responses to UTC Second Set of ROGs (Nos. 2-9)			
PTX-0937	2024-11-07 Liquidia Responses to UTC Third Set of ROGs (No. 10)			
PTX-0938	2024-11-08 UTC Responses to Liquidia Second Set of ROGs (Nos. 7-10)			H,R
PTX-0939	2024-11-13 UTC Suppl Responses to Liquidia First Set of ROGs (Nos. 1-6)			H,R
PTX-0940	2024-11-19 UTC Suppl Amended Responses to Liquidia First Set of ROGs (Nos. 1-6)			H,R
PTX-0941	2024-11-22 Liquidia Suppl Responses to UTC Second Set of ROGs (Nos. 2-9)			
PTX-0942	2024-12-02 Liquidia Suppl Responses to UTC ROG 1			
PTX-0943	Intentionally Left Blank			
PTX-0944	2021-06-16 UTC Press Release	UTC_PH-ILD_005414	UTC_PH-ILD_005418	R, H, 403
PTX-0945	2022-05-24 UTC Press Release	UTC_PH-ILD_005419	UTC_PH-ILD_005422	R, H, 403
PTX-0946	U.S. Patent No. 11,826,327 File History	UTC_PH-ILD_011016	UTC_PH-ILD_013161	
PTX-0947	2020-11-19 FDA to UTC re IND 134582 Meeting Request Written Responses	UTC_PH-ILD_013655	UTC_PH-ILD_013667	R, H
PTX-0948	2021-03-31 FDA to UTC re NDA 22387/S-017 Supplemental Approval	UTC_PH-ILD_013706	UTC_PH-ILD_013816	R, H
PTX-0949	2021-09-24 FDA to UTC re NDA 214324 Labeling Discussion Comments	UTC_PH-ILD_013915	UTC_PH-ILD_013955	R, H
PTX-0950	2022-04-09 FDA to UTC re NDA 214324 Labeling Discussion Comments	UTC_PH-ILD_014055	UTC_PH-ILD_014075	R, H
PTX-0951	2022-05-23 FDA to UTC re NDA 214324 NDA Approval	UTC_PH-ILD_014104	UTC_PH-ILD_014159	R, H
PTX-0952	1.6.1 Meeting Request Tropreprostil Inhalation Powder	UTC_PH-ILD_022684	UTC_PH-ILD_022691	R, H
PTX-0953	2020-11-19 FDA to UTC re IND 134582 Meeting Request Written Responses	UTC_PH-ILD_030077	UTC_PH-ILD_030089	R, H
PTX-0954	1.4.4 Cross Reference to Other Applications NDA 214324	UTC_PH-ILD_048365	UTC_PH-ILD_048393	
PTX-0955	RIN-PH-201_SEV Slides_version 1 0_draft_30Jul15 AL with BEAT	UTC_PH-ILD_075317	UTC_PH-ILD_075381	
PTX-0956	Chronic Obstructive Pulmonary Disease AND ILD_Lit Review	UTC_PH-ILD_080925	UTC_PH-ILD_080934	H, FN, 403
PTX-0957	RIN-PH-201_Lariat_Rise-IIP Comparison Table Highlighted	UTC_PH-ILD_081071	UTC_PH-ILD_081073	H, R, FN, 403
PTX-0958	2016-05-05 Tyvaso PH-ILD Forecast	UTC_PH-ILD_081093	UTC_PH-ILD_081112	
PTX-0959	INCREASE study, Amendment 3	UTC_PH-ILD_081861	UTC_PH-ILD_081936	
PTX-0960	Kolb 2022	UTC_PH-ILD_119437	UTC_PH-ILD_119451	H, R
PTX-0961	Martine Update 1 Aug	UTC_PH-ILD_143607	UTC_PH-ILD_143638	
PTX-0962	2017-06-26 R&D Update	UTC_PH-ILD_143835	UTC_PH-ILD_143845	R
PTX-0963	DSUR 2016-05 to 2017-05 DSUR 07 (IVSCInhOral) Report Body_for PD_Tyvaso updates_ja	UTC_PH-ILD_143849	UTC_PH-ILD_144000	OT, BE, R, H
PTX-0964	2024-02-26 [026] [SEALED] UTC Opening Brief ISO Motion for PI			H, IE, BRPL
PTX-0965	2024-02-26 [027] [SEALED] Flynn Declaration Exs. 1-7			H, IE, BRPL, C
PTX-0966	2024-04-15 [065] [SEALED] UTC Reply Brief ISO Motion for PI			H, IE, BRPL
PTX-0967	2024-04-15 [066] [SEALED] Flynn Reply Declaration ISO Motion for PI			H, IE, BRPL
PTX-0968	2024-05-31 [096] Memorandum ORDER re Motion for PI			BRPL
PTX-0969	2024-11-04 [180] [SEALED] UTC Letter to Judge Fallon re Motion to Compel			H, IE, BRPL
PTX-0970	2024-11-12 [193] Memorandum Order re [151] Joint Mot for Teleconf to Resolve Disc Dispute			BRPL
PTX-0971	U.S. Patent Application Publication No. 2019/0321290 (Guarneri)			U, R
PTX-0972	Intentionally Left Blank			
PTX-0973	2024-03-21 UTC's Paragraph 4 Disclosures			H, IE, BRPL
PTX-0974	2024-03-29 UTC's Paragraph 26 Disclosures			H, IE, BRPL
PTX-0975	2024-04-01 Liquidia's Rule 26 Initial Disclosures			
PTX-0976	2024-04-05 Liquidia's Paragraph 3 ESI Disclosures			
PTX-0977	2024-04-05 UTC's Disclosures Pursuant to Paragraph 3 of Default Standard			H, IE, BRPL
PTX-0978	2024-10-16 UTC's First Amended Initial Disclosures			H, IE, BRPL
PTX-0979	2024-06-03 Liquidia Initial Invalidity Contentions			

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-0980	2024-07-16 Liquidia First Amended Invalidity Contentions			
PTX-0981	2024-10-30 Liquidia's Second Amended Invalidity Contentions			
PTX-0982	2024-12-03 Liquidia's Final Invalidity Contentions			
PTX-0983	2024-05-02 UTC Initial Infringement Contentions			H, IE, BRPL
PTX-0984	2024-10-30 UTC Final Infringement Contentions			H, IE, BRPL
PTX-0985	20+P986:M98723-12-12 Liquidia's Notice Letter	LIQ_PH-ILD_00100789	LIQ_PH-ILD_00100816	BE
PTX-0986	NDA 213005 Amendment (SN0051) Agreed Initial Pediatric Study Plan – Agreement	LIQ_PH-ILD_00091252	LIQ_PH-ILD_00091259	
PTX-0987	NDA 213005 Resubmission (SN0030) Section 3.2.R.4.P Medical Device [LIQ861 Inhalation Powder, Capsule, Liquidia Technologies, Inc.]	LIQ_PH-ILD_00088041	LIQ_PH-ILD_00088108	
PTX-0988	Press Release, liquidia.com, "Liquidia Submits Amendment to Add PH-ILD Indication to Tentatively Approved NDA for YUTREPIA™ (treprostinil) Inhalation Powder," July 27, 2023			U, R
PTX-0989	Liquidia's Notification Pursuant to § 505(b)(3)(B) of the Federal Food, Drug, & Cosmetic Act (21 U.S.C. § 355(b)(3)(B)(ii) and 21 C.F.R. §314.52), Dec. 12, 2023			
PTX-0990	Transcript from 42nd Annual J.P. Morgan Healthcare Conference, Jan. 10, 2024			U, 403, IO, R
PTX-0991	Press Release, liquidia.com, "Liquidia Corporation Provides Update on New Drug Application for YUTREPIA™ (treprostinil) inhalation powder," Jan. 25, 2024			R, 403
PTX-0992	Information Disclosure Statement by Applicant in U.S. Patent Application No. 17/233,061 (listing references A1-A136), submitted May 12, 2021, initialed and signed by Examiner Feb. 27, 2023			
PTX-0993	Information Disclosure Statement by Applicant in U.S. Patent Application No. 17/233,061 (listing references C1-C329), submitted Feb. 16, 2022, initialed and signed by Examiner Feb. 27, 2023			
PTX-0994	Excerpts from Examiner Search Results for U.S. Patent Application No. 17/233,061, filename 20220823-17233061-txt.docx, undated			IC, U, BE
PTX-0995	2024-02-26 [029] [SEALED]Preliminary Injunction Declaration of Frederic Selck, Ph.D			R, H
PTX-0996	Faria-Urbina's Conclusion section, UTC slide 28 from Oral Argument			U, IE, IC, H, R
PTX-0997	Orange Book: Approved Drug Products with Therapeutic Equivalence Evaluations. Drug Databases (https://www.fda.gov/Drugs/InformationOnDrugs/)			R, H, A
PTX-0998	U.S. FDA Grants Tentative Approval of YUTREPIA™ (treprostinil) Inhalation Powder for Patients with Pulmonary Arterial Hypertension (PAH) and Pulmonary Hypertension Associated with Interstitial Lung Disease (PH-ILD). August 19, 2024			U, R
PTX-0999	Liquidia Corporation Files Response to United Therapeutics Lawsuit and Files Counterclaims. January 8, 2024			U, R, 403
PTX-1000	LIQ861 NDA 213005, SN 0023 2020, 3.2.R.4.P	LIQ_PH-ILD_00096679	LIQ_PH-ILD_00096745	H, R, 403
PTX-1001	LIQ861 NDA 213005, SN 0023 2020, 2.4	LIQ_PH-ILD_00116030	LIQ_PH-ILD_00116051	H, R, 403
PTX-1002	2022-05-14 Liquidia PAH Expert Advisory Board Meeting	LIQ_PH-ILD_00119224	LIQ_PH-ILD_00119250	403, FN, H, R
PTX-1003	2022-05-14 Liquidia PAH Expert Advisory Board Meeting	LIQ_PH-ILD_00119079	LIQ_PH-ILD_00119147	403, FN, H, R
PTX-1004	2022-11-30 Liquidia Steering Committee Meeting	LIQ_PH-ILD_00123034	LIQ_PH-ILD_00123067	403, FN, H, R, C
PTX-1005	2023-05-20 Liquidia PH-ILD Advisory Board	LIQ_PH-ILD_00122293	LIQ_PH-ILD_00122437	403, FN, H, R, C
PTX-1006	2023-08-02 Liquidia Board of Directors Meeting	LIQ_PH-ILD_00130594	LIQ_PH-ILD_00130619	403, FN, H, R, A, OT, C
PTX-1007	2024-05-17 Liquidia Steering Committee Meeting	LIQ_PH-ILD_00132055	LIQ_PH-ILD_00132116	403, FN, H, R
PTX-1008	2022-07-27 Email from Rajeev Saggar to Adair et al re low vs. high resistance	LIQ_PH-ILD_00119161	LIQ_PH-ILD_00119161	403, H, R
PTX-1009	2022-07-28 Email from Rajeev Saggar to Moomaw et al re RS00 vs. Dreamboat Decision	LIQ_PH-ILD_00119253	LIQ_PH-ILD_00119254	403, H, R
PTX-1010	2023-03-28 Email from Gwyn to Gallant et al re Tyvaso Qual DPI Market Research	LIQ_PH-ILD_00121010	LIQ_PH-ILD_00121010	403, H, R
PTX-1011	Clinical Design Concepts Using Yutrepla - Survey Results	LIQ_PH-ILD_00119825	LIQ_PH-ILD_00119828	403, H, R
PTX-1012	2023-02-08 Email from Rajeev Saggar to weidman re attached: IND 129819 Type B Pre-sNDA Meeting Minutes (WRO)	LIQ_PH-ILD_00120422	LIQ_PH-ILD_00120423	403, H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-1013	2023-03-30 Email from Rajeev Saggar to Chen re NDA with Liquidia	LIQ_PH-ILD_00121031	LIQ_PH-ILD_00121032	403, H, R
PTX-1014	2023-04-27 Email from Rajeev Saggar to Adair re 1Q'23 Earnings Call Prep	LIQ_PH-ILD_00121455	LIQ_PH-ILD_00121457	403, H, R
PTX-1015	2023-07-13 Liquidia Ascent Kick-Off Meeting	LIQ_PH-ILD_00123175	LIQ_PH-ILD_00123226	403, H, R
PTX-1016	2023-08-07 Liquidia SoW6 FLUIDDA, Exhibit 1 Schedule of Work #6	LIQ_PH-ILD_00124785	LIQ_PH-ILD_00124791	403, H, R
PTX-1017	Spreadsheet: LTI-401 Master Site Tracker 01Sep23	LIQ_PH-ILD_00125069	LIQ_PH-ILD_00125069	403, H, R
PTX-1018	Advancing the Treatment Landscape of PH-ILD: Insights from Clinical Trials	LIQ_PH-ILD_00132876	LIQ_PH-ILD_00132879	403, H, R
PTX-1019	2022-12-15 Email from Rajeev Saggar to Gwyn re clinical studies revisited	LIQ_PH-ILD_00119833	LIQ_PH-ILD_00119836	403, H, R
PTX-1020	2023-07-24 Email from Rajeev Saggar to Jeffs re NDA 213005 - FDA Response	LIQ_PH-ILD_00123473	LIQ_PH-ILD_00123475	403, H, R
PTX-1021	Liquidia Corp, Form 10-K (2022)	UTC_PH-ILD_002744	UTC_PH-ILD_003051	403, R, C
PTX-1022	Liquidia Corp, Form 10-K (2021)	UTC_PH-ILD_002568	UTC_PH-ILD_002743	403, R
PTX-1023	Liquidia Corp, Form 10-K (2020)	UTC_PH-ILD_002358	UTC_PH-ILD_002567	403, R
PTX-1024	Liquidia Tech, Form 10-K (2019)	UTC_PH-ILD_003386	UTC_PH-ILD_003645	403, R, C
PTX-1025	Liquidia Tech, Form 10-K (2018)	UTC_PH-ILD_003164	UTC_PH-ILD_003385	403, R
PTX-1026	20230915 FDA to LIQ Email NDA 213005 - FDA Response to July 24, 2023 submission	LIQ_PH-ILD_00098348	LIQ_PH-ILD_00098349	403, H, R, C
PTX-1027	20240202 LIQ to FDA Email Liquidia Response to UTC Letter Regarding YUTREPIA	LIQ_PH-ILD_00100329	LIQ_PH-ILD_00100329	403, H, R
PTX-1028	20231222 LIQ to FDA Email_NDA 213005 - FDA Request for Information - Response	LIQ_PH-ILD_00100357	LIQ_PH-ILD_00100359	403, H, R, C
PTX-1029	20240205 FDA to LIQ Email NDA 213005 - availability for phone call	LIQ_PH-ILD_00100364	LIQ_PH-ILD_00100364	403, H, R
PTX-1030	20240206 FDA to LIQ Email Regarding NDA 213005 - summary of phone call	LIQ_PH-ILD_00100367	LIQ_PH-ILD_00100368	403, H, R
PTX-1031	20240108 LIQ to FDA Email regarding submission for final approval	LIQ_PH-ILD_00100369	LIQ_PH-ILD_00100370	403, H, R
PTX-1032	20240212 LIQ to FDA Email Response Regarding NDA 213005 CMC Labeling Update	LIQ_PH-ILD_00100371	LIQ_PH-ILD_00100371	403, H, R, C
PTX-1033	20240213 LIQ to FDA Email Response United Therapeutics, Corp. response to Liquidia Technologies, Inc. letter issued February 2, 2024	LIQ_PH-ILD_00100372	LIQ_PH-ILD_00100373	403, H, R, C
PTX-1034	20230923 FDA to LIQ Email Confirmation of Submission for RFI - UTI Delivery Receipts	LIQ_PH-ILD_00100378	LIQ_PH-ILD_00100380	403, H, R
PTX-1035	20231220 LIQ to FDA Email Regarding Summary Judgement	LIQ_PH-ILD_00100402	LIQ_PH-ILD_00100402	403, H, R
PTX-1036	20230901 LIQ to FDA Email Regarding Patent Litigation	LIQ_PH-ILD_00100403	LIQ_PH-ILD_00100404	403, H, R
PTX-1037	20230923 FDA to LIQ Email NDA 213005 Acknowledge Class 2 Resubmission	LIQ_PH-ILD_00100406	LIQ_PH-ILD_00100409	403, H, R, C
PTX-1038	20230915 FDA to LIQ Email Regarding FDA Response to July 24 2023 Submission	LIQ_PH-ILD_00100411	LIQ_PH-ILD_00100412	403, H, R, C
PTX-1039	20231012 FDA to LIQ Email RFI Regarding Patent 887	LIQ_PH-ILD_00100413	LIQ_PH-ILD_00100413	403, H, R
PTX-1040	20240123 FDA to LIQ Email_NDA 213005-FDA Request Labeling	LIQ_PH-ILD_00100434	LIQ_PH-ILD_00100435	403, H, R, C
PTX-1041	20231012 FDA to LIQ Email RFI Regarding Patent 887	LIQ_PH-ILD_00100453	LIQ_PH-ILD_00100453	403, H, R
PTX-1042	20240123 LIQ to FDA ACK Email_Regarding UTC Response	LIQ_PH-ILD_00100455	LIQ_PH-ILD_00100456	403, H, R
PTX-1043	20230824 LIQ to FDA Email Response Regarding sNDA filing	LIQ_PH-ILD_00100461	LIQ_PH-ILD_00100462	403, H, R
PTX-1044	20221122 LIQ to FDA Email Request for Clarification prior to sNDA filing	LIQ_PH-ILD_00100481	LIQ_PH-ILD_00100482	403, H, R
PTX-1045	20240109 FDA to LIQ Email ACK regarding final approval submission	LIQ_PH-ILD_00100501	LIQ_PH-ILD_00100503	403, H, R
PTX-1046	20230822 FDA to LIQ Email Regarding sNDA filing	LIQ_PH-ILD_00100524	LIQ_PH-ILD_00100526	403, H, R
PTX-1047	20240103 LIQ to FDA Email notification regarding submission for final approval	LIQ_PH-ILD_00100527	LIQ_PH-ILD_00100527	403, H, R
PTX-1048	20240304 FDA to LIQ Email Response	LIQ_PH-ILD_00100581	LIQ_PH-ILD_00100582	403, H, R
PTX-1049	20230723 FDA to LIQ Email ACK Regarding sNDA filing	LIQ_PH-ILD_00100583	LIQ_PH-ILD_00100584	403, H, R
PTX-1050	20240215 FDA to LIQ Email Ack Regarding United Therapeutics, Corp. response to Liquidia Technologies, Inc. letter issued February 2, 2024	LIQ_PH-ILD_00100585	LIQ_PH-ILD_00100587	403, H, R
PTX-1051	20240212 FDA to LIQ Email Regarding NDA213005 - FDA revisions to February 8, 2024 USPI	LIQ_PH-ILD_00100622	LIQ_PH-ILD_00100624	403, H, R
PTX-1052	20240213 FDA to LIQ Email United Therapeutics, Corp. response to Liquidia Technologies, Inc. letter issued February 2, 2024	LIQ_PH-ILD_00100654	LIQ_PH-ILD_00100655	403, H, R, C
PTX-1053	20240212 FDA to LIQ Email Regarding NDA 213005 CMC Labeling Update	LIQ_PH-ILD_00100684	LIQ_PH-ILD_00100685	403, H, R, C
PTX-1054	20231012 FDA to LIQ Email Regarding Additional Proprietary Name	LIQ_PH-ILD_00100691	LIQ_PH-ILD_00100693	
PTX-1055	20230922 NDA 213005 Acknowledge Class 2 Resubmission Letter	LIQ_PH-ILD_00100729	LIQ_PH-ILD_00100730	403, H, R, C
PTX-1056	20230921 FDA to LIQ Email RFI - FedEx Delivery Receipt to UTC	LIQ_PH-ILD_00100731	LIQ_PH-ILD_00100732	403, H, R
PTX-1057	20240117 FDA to LIQ Email_NDA 213005 - FDA Informal Meeting	LIQ_PH-ILD_00100737	LIQ_PH-ILD_00100739	403, H, R
PTX-1058	20240123 FDA to LIQ Email_NDA 213005-FDA Request Labeling	LIQ_PH-ILD_00100749	LIQ_PH-ILD_00100750	403, H, R, C

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-1059	20230915 LIQ to FDA Email Response Regarding FDA Response to July 24 2023 Submission	LIQ_PH-ILD_00100751	LIQ_PH-ILD_00100753	403, H, R
PTX-1060	20230908 LIQ to FDA Email OCHEC_ONDP Coordination	LIQ_PH-ILD_00100818	LIQ_PH-ILD_00100819	403, H, R
PTX-1061	20230921 FDA to LIQ Email Regarding Agreed iSP	LIQ_PH-ILD_00100845	LIQ_PH-ILD_00100847	403, H, R
PTX-1062	IND 129819 Agreed iSP - Initial Agreement	LIQ_PH-ILD_00100848	LIQ_PH-ILD_00100855	403, H, R
PTX-1063	20231219 FDA to LIQ Email_RFI	LIQ_PH-ILD_00100932	LIQ_PH-ILD_00100933	403, H, R
PTX-1064	20231222 LIQ to FDA Email_NDA 213005 - FDA Request for Information - Response	LIQ_PH-ILD_00100948	LIQ_PH-ILD_00100950	403, H, R, C
PTX-1065	20231219 FDA to LIQ Email_RFI	LIQ_PH-ILD_00100953	LIQ_PH-ILD_00100954	403, H, R, C
PTX-1066	20230723 LIQ to FDA Email Regarding sNDA filing	LIQ_PH-ILD_00100957	LIQ_PH-ILD_00100957	403, H, R, C
PTX-1067	20230927 LIQ to FDA Email Regarding RFI Clarification on UTI Delivery Receipts	LIQ_PH-ILD_00100975	LIQ_PH-ILD_00100976	403, H, R
PTX-1068	20230912 FDA to LIQ Email ACK OCHEC_ONDP Coordination	LIQ_PH-ILD_00101054	LIQ_PH-ILD_00101055	403, H, R
PTX-1069	20230922 FDA to LIQ Email RFI - UTI Delivery Receipts	LIQ_PH-ILD_00101056	LIQ_PH-ILD_00101056	403, H, R
PTX-1070	20240123 FDA to LIQ Email_Regarding UTC Response	LIQ_PH-ILD_00101070	LIQ_PH-ILD_00101071	403, H, R, C
PTX-1071	20240123 LIQ to FDA Response Email_Regarding UTC Response	LIQ_PH-ILD_00101084	LIQ_PH-ILD_00101085	403, H, R
PTX-1072	20240117 FDA to LIQ Email Regarding FDA Informal Meeting Housekeeping Items	LIQ_PH-ILD_00101101	LIQ_PH-ILD_00101103	403, H, R
PTX-1073	20230918 FDA to LIQ Email RFI - Agreed iSP	LIQ_PH-ILD_00101108	LIQ_PH-ILD_00101109	403, H, R
PTX-1074	20221125 FDA to LIQ Email Response Regarding Request for Clarification prior to sNDA filing	LIQ_PH-ILD_00101137	LIQ_PH-ILD_00101138	403, H, R
PTX-1075	20230927 FDA to LIQ Email Response Regarding RFI Clarification on UTI Delivery Receipts	LIQ_PH-ILD_00101151	LIQ_PH-ILD_00101153	403, H, R, C
PTX-1076	20230915 FDA to LIQ Email NDA 213005 - FDA Response to July 24, 2023 submission	LIQ_PH-ILD_00101172	LIQ_PH-ILD_00101173	403, H, R
PTX-1077	20230918 FDA to LIQ Email Response Regarding FDA Response to July 24 2023 Submission	LIQ_PH-ILD_00101175	LIQ_PH-ILD_00101178	403, H, R, C
PTX-1078	20231229 LIQ to FDA Email regarding RFI Submission	LIQ_PH-ILD_00101193	LIQ_PH-ILD_00101195	403, H, R
PTX-1079	20240123 LIQ to FDA Email NDA 213005_Sponsor response	LIQ_PH-ILD_00101196	LIQ_PH-ILD_00101197	403, H, R
PTX-1080	20230623 LIQ to FDA Email Request for Clarification prior to sNDA filing	LIQ_PH-ILD_00101201	LIQ_PH-ILD_00101202	403, H, R
PTX-1081	IND 129819 Type B Pre-sNDA Meeting Minutes (WRO)	LIQ_PH-ILD_00113402	LIQ_PH-ILD_00113410	403, H, R, C
PTX-1082	Grp 3 PH	LIQ_PH-ILD_00119066	LIQ_PH-ILD_00119066	403, H, R
PTX-1083	PH-ILD concept protocol v4.docx	LIQ_PH-ILD_00119067	LIQ_PH-ILD_00119077	403, H, R, C
PTX-1084	FW: IND 129819 - iSP Written Response - please confirm receipt	LIQ_PH-ILD_00119286	LIQ_PH-ILD_00119286	403, H, R
PTX-1085	IND 129819 Initial PSP - Written Response	LIQ_PH-ILD_00119287	LIQ_PH-ILD_00119294	403, H, R, C
PTX-1086	IND 129819 Type B Pre-sNDA Meeting Minutes (WRO)	LIQ_PH-ILD_00120011	LIQ_PH-ILD_00120019	403, H, R, C
PTX-1087	20240410 Email to Agency requesting guidance	LIQ_PH-ILD_00125725	LIQ_PH-ILD_00125726	403, H, R, C
PTX-1088	20240410 LIQ to FDA Email NDA 213005	LIQ_PH-ILD_00125727	LIQ_PH-ILD_00125728	403, H, R, C
PTX-1089	20240412 FDA to LIQ Email Receipt Confirmation NDA 213005	LIQ_PH-ILD_00125729	LIQ_PH-ILD_00125731	403, H, R, C
PTX-1090	20240409 FDA to LIQ Email Regarding NDA 213005_SN0062	LIQ_PH-ILD_00125732	LIQ_PH-ILD_00125734	403, H, R
PTX-1091	20240409 FDA to LIQ Email Confirmation Regarding NDA 213005_SN0062	LIQ_PH-ILD_00125735	LIQ_PH-ILD_00125736	403, H, R
PTX-1092	20240405 LIQ to FDA Email Confirmation Regarding NDA 213005_SN0062	LIQ_PH-ILD_00125737	LIQ_PH-ILD_00125737	403, H, R, C
PTX-1093	20240328 FDA to LIQ Injunction Approvability Lifted	LIQ_PH-ILD_00125738	LIQ_PH-ILD_00125742	403, H, R, BRPL
PTX-1094	20240402 LIQ to FDA Email Pending Approval	LIQ_PH-ILD_00125743	LIQ_PH-ILD_00125744	403, H, R
PTX-1095	20240328 FDA to LIQ Email Regarding Injunction Approvability Lifted	LIQ_PH-ILD_00125745	LIQ_PH-ILD_00125745	403, H, R
PTX-1096	20240520 LIQ to FDA Email NDA 213005 - Request for Meeting FDA	LIQ_PH-ILD_00125746	LIQ_PH-ILD_00125746	403, H, R
PTX-1097	20240710 FDA to LIQ Email Response Follow-up	LIQ_PH-ILD_00125747	LIQ_PH-ILD_00125748	403, H, R
PTX-1098	20240816 FDA Action Email	LIQ_PH-ILD_00126015	LIQ_PH-ILD_00126015	403, H, R
PTX-1099	IND 129819 Meeting Request Granted (WRO)	LIQ_PH-ILD_00134075	LIQ_PH-ILD_00134077	403, H, R
PTX-1100	fda-letter-mtg-req-granted-2022apr04	LIQ_PH-ILD_00134093	LIQ_PH-ILD_00134095	403, H, R
PTX-1101	Liquidia 8-K (June 15, 2022)	LIQ_PH-ILD_00143752	LIQ_PH-ILD_00143755	403, R
PTX-1102	FDA comments on the pediatric protocol for LIQ861 (attached)	LIQ_PH-ILD_00147495	LIQ_PH-ILD_00147495	403, H, R
PTX-1103	IND 129819: request for feedback - PREA PMR milestone dates	LIQ_PH-ILD_00147700	LIQ_PH-ILD_00147700	403, H, R
PTX-1104	20240710 LIQ to FDA Email Response Follow-up	LIQ_PH-ILD_00147778	LIQ_PH-ILD_00147779	403, H, R
PTX-1105	20240731 FDA to LIQ Email Response Regarding NDA Follow up	LIQ_PH-ILD_00147780	LIQ_PH-ILD_00147782	403, H, R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-1106	20240807 Liquidia Authorization to Disclose Confidential Info_2024_08_07.docx	LIQ_PH-ILD_00147783	LIQ_PH-ILD_00147783	403, H, R
PTX-1107	20240801 FDA to LIQ Liquidia Technologies - NDA 213005	LIQ_PH-ILD_00147784	LIQ_PH-ILD_00147790	403, H, R
PTX-1108	20240808 LIQ to FDA LQDA Authorization to Disclose 24_08_08	LIQ_PH-ILD_00147791	LIQ_PH-ILD_00147791	403, H, R
PTX-1109	20240807 FDA to LIQ Email DA disclosure authorization - Yutrepla (treprostinil) NDA	LIQ_PH-ILD_00147792	LIQ_PH-ILD_00147793	403, H, R
PTX-1110	20240808 LIQ to FDA Email LQDA Authorization to Disclose 24_08_08	LIQ_PH-ILD_00147794	LIQ_PH-ILD_00147796	403, H, R, C
PTX-1111	20240815 FDA to LIQ Email Followup	LIQ_PH-ILD_00147797	LIQ_PH-ILD_00147803	403, H, R
PTX-1112	20220411 FDA to LIQ Email IND 129819 Type B pre-sNDS Meeting Request Granted (WRO)	LIQ_PH-ILD_00147804	LIQ_PH-ILD_00147805	403, H, R
PTX-1113	20220411 FDA to LIQ Email IND 129819 - request for waiver of pediatric studies (PH-ILD)	LIQ_PH-ILD_00147806	LIQ_PH-ILD_00147807	403, H, R
PTX-1114	20220411 IND 129819 Type B pre-sNDS Meeting Request Granted (WRO)	LIQ_PH-ILD_00147808	LIQ_PH-ILD_00147810	H, R
PTX-1115	20220411 FDA to LIQ Email Regarding PH-ILD Request for Waiver of Peds Studies	LIQ_PH-ILD_00147811	LIQ_PH-ILD_00147812	403, H, R
PTX-1116	20220411 FDA to LIQ Email Type B pre-sNDA Meeting Request Granted	LIQ_PH-ILD_00147813	LIQ_PH-ILD_00147814	403, H, R
PTX-1117	Taichman 2021	UTC_PH-ILD_145595	UTC_PH-ILD_145596	H, R
PTX-1118	Nathan: Comparison of effects of inhaled treprostinil on lung function in patients with pulmonary hypertension associated with interstitial lung disease and pulmonary arterial hypertension	UTC_PH-ILD_146366	UTC_PH-ILD_146366	H, R
PTX-1119	2021-01-28 Email from Bell to Deng et al re Inhaled Treprostinil in PH Due to ILD NEJM	UTC_PH-ILD_145605	UTC_PH-ILD_145606	403, H, R
PTX-1120	2023-07-24 Liquidia letter to FDA re NDA 213005 Amendment	LIQ_PH-ILD_00091022	LIQ_PH-ILD_00091022	H
PTX-1121	2023-09-22 Liquidia letter to FDA re NDA 213005 Agreed initial Pediatric Study Plan	LIQ_PH-ILD_00091261	LIQ_PH-ILD_00091261	403, R
PTX-1122	2021-12-02 Liquidia Steering Committee Meeting	LIQ_PH-ILD_00114107	LIQ_PH-ILD_00114157	403, R
PTX-1123	PH ILD Regulatory Dec 2022 DRAFT	LIQ_PH-ILD_00119931	LIQ_PH-ILD_00119934	403, BE, R
PTX-1124	2015-01-25 Email from Zaccardelli to Jeffs et al re Program Management Meeting	UTC_WAT_00539159	UTC_WAT_00539159	403, H, R
PTX-1125	Program Management Meeting re Tyvaso WHO Group 3 potential development (1.25.2015)	UTC_WAT_00539160	UTC_WAT_00539160	403, H, R
PTX-1126	Pulmonary Function Testing presentation	UTC_PH-ILD_075274	UTC_PH-ILD_075299	R
PTX-1127	2015-09-18 Email from Lim to Rubin re updated RIN-PH-201 Protocol Synopsis for Review by September 25th	UTC_PH-ILD_076330	UTC_PH-ILD_076330	R, C
PTX-1128	16.1.1 RIN-PH-201 Protocol Synopsis 9.18.15	UTC_PH-ILD_076331	UTC_PH-ILD_076343	BE, R, C
PTX-1129	RIN-PH-201 Medical Review of Inclusion and Exclusion Criteria based on Amendment 1 dated 20 Nov 2015	UTC_PH-ILD_081468	UTC_PH-ILD_081500	R, C
PTX-1130	RIN-PH-201 Steering Committee Meeting Minutes 6.21.16 FINAL	UTC_PH-ILD_081734	UTC_PH-ILD_081737	R, C
PTX-1131	RIN-PH-201 Protocol Amendment 3_Summary of Changes_15Feb17	UTC_PH-ILD_082055	UTC_PH-ILD_082060	BE, R, C
PTX-1132	RIN-PH-201_Protocol Amendment 2 Summary of Changes_13Sep16	UTC_PH-ILD_083282	UTC_PH-ILD_083289	BE, R, C
PTX-1133	UTH-10020047142-RIN-PH-201_Medical Management Plan_v2.0_FINAL_30Nov15_all_signatures	UTC_PH-ILD_084090	UTC_PH-ILD_084106	R, C
PTX-1134	RIN-PH-201 Medical Management Plan (Aug. 2015	UTC_PH-ILD_084107	UTC_PH-ILD_084123	R, C
PTX-1135	rinhph201-protocol-2	UTC_PH-ILD_054951	UTC_PH-ILD_055021	R, C
PTX-1136	rinhph201-protocol-3	UTC_PH-ILD_055022	UTC_PH-ILD_055102	R, C
PTX-1137	UTH-1251-227 Committee Correspondence_21-Oct-2015	UTC_PH-ILD_084614	UTC_PH-ILD_084617	H, R
PTX-1138	waxman-2023-eur-respir-j	UTC_PH-ILD_048735	UTC_PH-ILD_048792	R
PTX-1139	INCREASE CT Scan Review Minutes December 2018	UTC_PH-ILD_082312	UTC_PH-ILD_082312	R
PTX-1140	SD2018_PERFECT_AaronWaxman_Round5_v2	UTC_PH-ILD_095410	UTC_PH-ILD_095424	R
PTX-1141	2022-10-07 Email from Galloway t Tully et al re Yutrepla Safety Update	LIQ_PH-ILD_00106028	LIQ_PH-ILD_00106029	403, R
PTX-1142	2022-08-03 Email from Patel to MacLennan et al re DPI Powder and Device Differences	LIQ_PH-ILD_00116188	LIQ_PH-ILD_00116188	403, R
PTX-1143	2022-05-14 Liquidia PAH Expert Advisory Board Meeting	LIQ_PH-ILD_00120765	LIQ_PH-ILD_00120835	403, R
PTX-1144	2023-10-01 Liquidia Investigator's Brochure	LIQ_PH-ILD_00125638	LIQ_PH-ILD_00125719	403, R
PTX-1145	UTC Form 10-K (2011)	UTC_PH-ILD_005529	UTC_PH-ILD_005688	

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-1146	UTC Form 10-K (2012)	UTC_PH-ILD_005689	UTC_PH-ILD_005858	
PTX-1147	UTC Form 10-K (2013)	UTC_PH-ILD_005859	UTC_PH-ILD_006038	
PTX-1148	UTC Form 10-K (2014)	UTC_PH-ILD_006039	UTC_PH-ILD_006228	
PTX-1149	UTC Form 10-K (2015)	UTC_PH-ILD_006229	UTC_PH-ILD_006385	
PTX-1150	UTC Form 10-K (2016)	UTC_PH-ILD_006386	UTC_PH-ILD_006537	
PTX-1151	UTC Form 10-K (2017)	UTC_PH-ILD_006538	UTC_PH-ILD_006751	
PTX-1152	UTC Form 10-K (2018)	UTC_PH-ILD_006752	UTC_PH-ILD_006961	
PTX-1153	UTC Form 10-K (2019)	UTC_PH-ILD_006962	UTC_PH-ILD_007130	
PTX-1154	UTC Form 10-K (2020)	UTC_PH-ILD_007131	UTC_PH-ILD_007253	
PTX-1155	UTC_PH-ILD_009408-409_Tyvaso DPI and Nebulized Tyvaso Gross Margins	UTC_PH-ILD_009408	UTC_PH-ILD_009409	
PTX-1156	UTHR Daily Analyst Notes Oct22 20	UTC_PH-ILD_113236	UTC_PH-ILD_113238	403, H, R
PTX-1157	UTHR Daily Analyst Notes Jul10 23	UTC_PH-ILD_218300	UTC_PH-ILD_218311	403, H, R
PTX-1158	Application to Market a New or Abbreviated New Drug or Biologic for Human use (Form 356h)	LIQ_PH-ILD_00091246	LIQ_PH-ILD_00091250	403, R
PTX-1159	ASCENT Pharmacy Manual v3 20240222	LIQ_PH-ILD_00144590	LIQ_PH-ILD_00144662	403, R
PTX-1160	20210614 NDA 213005 General Advice Letter	LIQ_PH-ILD_00013854	LIQ_PH-ILD_00013857	403, H, R
PTX-1161	20210614 FDA to LIQ Email_General Advice Letter	LIQ_PH-ILD_00013858	LIQ_PH-ILD_00013859	403, H, R
PTX-1162	2023-09-21 Liquidia Letter to FDA re General Information	LIQ_PH-ILD_00091211	LIQ_PH-ILD_00091211	403, R
PTX-1163	2023-12-19 Email from Cooney to Weidman re NDA 213005 FDA Request for Information	LIQ_PH-ILD_00091411	LIQ_PH-ILD_00091412	403, H, R
PTX-1164	2023-12-22 Email from Weidman to Cooney re NDA 213005 FDA Request for Information	LIQ_PH-ILD_00091413	LIQ_PH-ILD_00091415	403, R
PTX-1165	SN0049 Cover Letter 20230724 signed	LIQ_PH-ILD_00098833	LIQ_PH-ILD_00098833	403, R
PTX-1166	2023-12-08 Paragraph IV Certification	LIQ_PH-ILD_00091352	LIQ_PH-ILD_00091352	403, R
PTX-1167	NDA 213005, SN0001 1.12.14	LIQ_PH-ILD_00046039	LIQ_PH-ILD_00046039	403, IC, R
PTX-1168	NDA 213005, SN0001 1.3.2	LIQ_PH-ILD_00046050	LIQ_PH-ILD_00046050	403, IC, R
PTX-1169	NDA 213005, SN0001 1.3.3	LIQ_PH-ILD_00045980	LIQ_PH-ILD_00045980	403, IC, R
PTX-1170	NDA 213005, SN0001 1.3.5.3	LIQ_PH-ILD_00046045	LIQ_PH-ILD_00046045	403, IC, R
PTX-1171	NDA 213005, SN0001 2.3.p	LIQ_PH-ILD_00045801	LIQ_PH-ILD_00045923	403, IC, R
PTX-1172	NDA 213005, SN0001 2.3.r	LIQ_PH-ILD_00045957	LIQ_PH-ILD_00045963	403, IC, R
PTX-1173	NDA 213005, SN0001 2.4	LIQ_PH-ILD_00045779	LIQ_PH-ILD_00045800	403, IC, R
PTX-1174	NDA 213005, SN0001 2.6.2	LIQ_PH-ILD_00045593	LIQ_PH-ILD_00045613	403, IC, R
PTX-1175	NDA 213005, SN0001 2.6.3	LIQ_PH-ILD_00045556	LIQ_PH-ILD_00045560	403, IC, R
PTX-1176	NDA 213005, SN0001 2.6.4	LIQ_PH-ILD_00045561	LIQ_PH-ILD_00045592	403, IC, R
PTX-1177	NDA 213005, SN0001 2.6.5	LIQ_PH-ILD_00045614	LIQ_PH-ILD_00045630	403, IC, R
PTX-1178	NDA 213005, SN0001 2.6.6	LIQ_PH-ILD_00045719	LIQ_PH-ILD_00045778	403, IC, R
PTX-1179	NDA 213005, SN0001 2.6.7	LIQ_PH-ILD_00045631	LIQ_PH-ILD_00045718	403, IC, R
PTX-1180	NDA 213005, SN0001 2.7.5	LIQ_PH-ILD_00045333	LIQ_PH-ILD_00045334	403, IC, R
PTX-1181	NDA 213005, SN0001 3.2.p.1	LIQ_PH-ILD_00062233	LIQ_PH-ILD_00062235	H, R, 403
PTX-1182	NDA 213005, SN0001 3.2.p.2.1	LIQ_PH-ILD_00062249	LIQ_PH-ILD_00062257	H, R, 403
PTX-1183	NDA 213005, SN0001 3.2.p.2.2	LIQ_PH-ILD_00062258	LIQ_PH-ILD_00062309	R
PTX-1184	NDA 213005, SN0001 3.2.p.2.3	LIQ_PH-ILD_00062310	LIQ_PH-ILD_00062465	R
PTX-1185	NDA 213005, SN0001 3.2.p.2.4	LIQ_PH-ILD_00062466	LIQ_PH-ILD_00062710	R
PTX-1186	NDA 213005, SN0001 3.2.p.2.5	LIQ_PH-ILD_00062711	LIQ_PH-ILD_00062713	R
PTX-1187	NDA 213005, SN0001 3.2.p.2.6	LIQ_PH-ILD_00062245	LIQ_PH-ILD_00062248	H, R
PTX-1188	NDA 213005, SN0001 3.2.p.3.1	LIQ_PH-ILD_00062187	LIQ_PH-ILD_00062187	H, R
PTX-1189	NDA 213005, SN0001 3.2.p.3.2	LIQ_PH-ILD_00062087	LIQ_PH-ILD_00062087	H, R, 403
PTX-1190	NDA 213005, SN0001 3.2.p.3.3	LIQ_PH-ILD_00062088	LIQ_PH-ILD_00062100	R
PTX-1191	NDA 213005, SN0001 3.2.p.3.4	LIQ_PH-ILD_00062101	LIQ_PH-ILD_00062183	R
PTX-1192	NDA 213005, SN0001 3.2.p.3.5	LIQ_PH-ILD_00062184	LIQ_PH-ILD_00062186	R
PTX-1193	NDA 213005, SN0001 3.2.p.4.1	LIQ_PH-ILD_00070150	LIQ_PH-ILD_00070150	R
PTX-1194	NDA 213005, SN0001 3.2.p.4.2	LIQ_PH-ILD_00070123	LIQ_PH-ILD_00070123	R
PTX-1195	NDA 213005, SN0001 3.2.p.4.3	LIQ_PH-ILD_00070124	LIQ_PH-ILD_00070124	R
PTX-1196	NDA 213005, SN0001 3.2.p.4.4	LIQ_PH-ILD_00070125	LIQ_PH-ILD_00070133	R

PTX No.	Description	BegBates	EndBates	Defendant's Objections
PTX-1197	NDA 213005, SN0001 3.2.p.4.5	LIQ_PH-ILD_00062232	LIQ_PH-ILD_00062232	R
PTX-1198	NDA 213005, SN0001 3.2.p.5.1	LIQ_PH-ILD_00070239	LIQ_PH-ILD_00070252	R
PTX-1199	NDA 213005, SN0001 3.2.p.5.2	LIQ_PH-ILD_00070159	LIQ_PH-ILD_00070159	R
PTX-1200	NDA 213005, SN0001 3.2.p.5.3	LIQ_PH-ILD_00070122	LIQ_PH-ILD_00070122	R
PTX-1201	NDA 213005, SN0001 3.2.p.5.4	LIQ_PH-ILD_00069683	LIQ_PH-ILD_00069806	R, H
PTX-1202	NDA 213005, SN0001 3.2.p.5.5	LIQ_PH-ILD_00069860	LIQ_PH-ILD_00069890	R, H
PTX-1203	NDA 213005, SN0001 3.2.p.5.6	LIQ_PH-ILD_00069668	LIQ_PH-ILD_00069682	R, H
PTX-1204	NDA 213005, SN0001 3.2.p.6	LIQ_PH-ILD_00062074	LIQ_PH-ILD_00062076	R
PTX-1205	NDA 213005, SN0001 3.2.p.7	LIQ_PH-ILD_00061977	LIQ_PH-ILD_00062029	R, H, 403
PTX-1206	NDA 213005, SN0001 3.2.p.8.1	LIQ_PH-ILD_00062034	LIQ_PH-ILD_00062072	R, H
PTX-1207	NDA 213005, SN0001 3.2.p.8.2	LIQ_PH-ILD_00061658	LIQ_PH-ILD_00061660	R, H
PTX-1208	NDA 213005, SN0001 3.2.p.8.3	LIQ_PH-ILD_00061661	LIQ_PH-ILD_00061794	R, H
PTX-1209	NDA 213005, SN0001 3.2.r.1.p	LIQ_PH-ILD_00046534	LIQ_PH-ILD_00046539	R, H
PTX-1210	NDA 213005, SN0001 3.2.r.2.p	LIQ_PH-ILD_00046522	LIQ_PH-ILD_00046533	R
PTX-1211	NDA 213005, SN0001 3.2.r.3.p	LIQ_PH-ILD_00050804	LIQ_PH-ILD_00050804	R
PTX-1212	NDA 213005, SN0001 3.2.r.4.p	LIQ_PH-ILD_00050805	LIQ_PH-ILD_00050858	R, H, 403, C
PTX-1213	NDA 213005, SN0001 3.2.s.1.1	LIQ_PH-ILD_00061048	LIQ_PH-ILD_00061048	R
PTX-1214	NDA 213005, SN0001 3.2.s.1.2	LIQ_PH-ILD_00061050	LIQ_PH-ILD_00061050	R, H
PTX-1215	NDA 213005, SN0001 3.2.s.1.3	LIQ_PH-ILD_00061047	LIQ_PH-ILD_00061047	R
PTX-1216	NDA 213005, SN0001 3.2.s.2.1	LIQ_PH-ILD_00061657	LIQ_PH-ILD_00061657	R
PTX-1217	NDA 213005, SN0001 3.2.s.2.2	LIQ_PH-ILD_00061055	LIQ_PH-ILD_00061055	R
PTX-1218	NDA 213005, SN0001 3.2.s.2.3	LIQ_PH-ILD_00061052	LIQ_PH-ILD_00061052	R
PTX-1219	NDA 213005, SN0001 3.2.s.2.4	LIQ_PH-ILD_00061053	LIQ_PH-ILD_00061053	R
PTX-1220	NDA 213005, SN0001 3.2.s.2.5	LIQ_PH-ILD_00061056	LIQ_PH-ILD_00061056	R
PTX-1221	NDA 213005, SN0001 3.2.s.2.6	LIQ_PH-ILD_00061054	LIQ_PH-ILD_00061054	R
PTX-1222	NDA 213005, SN0001 3.2.s.3.1	LIQ_PH-ILD_00061049	LIQ_PH-ILD_00061049	R
PTX-1223	NDA 213005, SN0001 3.2.s.3.2	LIQ_PH-ILD_00061051	LIQ_PH-ILD_00061051	R
PTX-1224	NDA 213005, SN0001 3.2.s.4.1	LIQ_PH-ILD_00069666	LIQ_PH-ILD_00069667	R, H
PTX-1225	NDA 213005, SN0001 3.2.s.4.2	LIQ_PH-ILD_00069665	LIQ_PH-ILD_00069665	R
PTX-1226	NDA 213005, SN0001 3.2.s.4.3	LIQ_PH-ILD_00069505	LIQ_PH-ILD_00069505	R
PTX-1227	NDA 213005, SN0001 3.2.s.4.4	LIQ_PH-ILD_00069496	LIQ_PH-ILD_00069504	R, H
PTX-1228	NDA 213005, SN0001 3.2.s.4.5	LIQ_PH-ILD_00069658	LIQ_PH-ILD_00069664	R, H
PTX-1229	NDA 213005, SN0001 3.2.s.5	LIQ_PH-ILD_00059031	LIQ_PH-ILD_00059031	R
PTX-1230	NDA 213005, SN0001 3.2.s.6	LIQ_PH-ILD_00058747	LIQ_PH-ILD_00058747	R
PTX-1231	NDA 213005, SN0001 3.2.s.7.1	LIQ_PH-ILD_00059034	LIQ_PH-ILD_00059034	R
PTX-1232	NDA 213005, SN0001 3.2.s.7.2	LIQ_PH-ILD_00059033	LIQ_PH-ILD_00059033	R
PTX-1233	NDA 213005, SN0001 3.2.s.7.3	LIQ_PH-ILD_00059032	LIQ_PH-ILD_00059032	R
PTX-1234	LIQ_PH-ILD_00147313 metadata			R, H, 403, IE, FN, A, C
PTX-1235	2024-11-19 Email from Liquidia counsel to UTC counsel enclosing documents produced by Liquidia bearing Bates numbers LIQ_PH-ILD_00147313 – LIQ_PH-ILD_00147321			H, R
PTX-1236	2024-03-11 Email from Rajan Saggar to Waddell re Slide deck Follow Up	LIQ_PH-ILD_00144706	LIQ_PH-ILD_00144743	H, R, 403
PTX-1237	2022-05-25 FDA Letter to Liquidia re Advice/Information Request	LIQ_PH-ILD_00147496	LIQ_PH-ILD_00147501	R, H, 403
PTX-1238	2024-02-22 Email from Galloway to Chambers et al re ASCENT Pharmacy Manual Update	LIQ_PH-ILD_00144589	LIQ_PH-ILD_00144589	H, R, 403
PTX-1239	Briefing Document: Type B Pre-sNDA Meeting, IND 129819, LIQ861 - treprostinil inhalation powder	LIQ_PH-ILD_00134062	LIQ_PH-ILD_00134072	H, R, 403
PTX-1240	Amen: Analysis of V/Q-matching—a safety “biomarker” in pulmonary drug development?	UTC_PH-ILD_009839	UTC_PH-ILD_009845	R, H
PTX-1241	An ASCENT to Week 8: Initial Safety and Exploratory Efficacy Data on LIQ861 Dry Powder Inhaled Treprostinil in PH-ILD Patients	UTC_PH-ILD_227596	UTC_PH-ILD_227596	H, R, 403, FN

EXHIBIT 11

DEFENDANT'S TRIAL EXHIBIT LIST

DTX NO.	BegBates	EndBates	Description	UTC Objections
DTX0001	UTC_PH-ILD_005310	UTC_PH-ILD_005360	U.S. Patent No. 11,826,327	403, IC, BE, C, FN
DTX0002	UTC_PH-ILD_009772	UTC_PH-ILD_009796	U.S. Patent No. 10,716,793	403, IC, BE, C, FN
DTX0003	LIQ_PH-ILD_00000001	LIQ_PH-ILD_00000012	United Therapeutics Corporation FQ1 2018 Earnings Call Transcript, (May 2, 2018)	A, C, FN, H, BE
DTX0004	LIQ_PH-ILD_00000013	LIQ_PH-ILD_00000023	UTC Earnings Call – Q4 2022	A, C, FN, H, BE
DTX0005	LIQ_PH-ILD_00000024	LIQ_PH-ILD_00000030	Email exchange between counsel re Meet & Confer on Preliminary Injunction Motion, February 2024	A, C, FN, IC, 403, H, LC, R, MIS
DTX0006	LIQ_PH-ILD_00000031	LIQ_PH-ILD_00000033	Email from Michael Flynn dated Feb. 22, 2024	A, C, FN, IC, 403, H, LC, R, MIS
DTX0007	LIQ_PH-ILD_00000110	LIQ_PH-ILD_00000184	Patent Owner Response, <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406	BRPL, IE, LC, 403
DTX0008	LIQ_PH-ILD_00000185	LIQ_PH-ILD_00000215	NCT02630316: Safety and Efficacy of Inhaled Treprostinil in Adult PH With ILD Including CPFE (Feb., 10, 2017), available at https://clinicaltrials.gov/study/NCT02630316?term=NCT02630316&rank=1&tab=history&a=23	A, C, FN, FRE 106, H, IC
DTX0009	LIQ_PH-ILD_00000216	LIQ_PH-ILD_00000225	Nathan S et al., Inhaled Treprostinil and Forced Vital Capacity in Patients with Interstitial Lung Disease and Associated Pulmonary Hypertension: A Post-hoc Analysis of the INCREASE Study, <i>(9) Lancet Respir Med</i> (2021)	A, C, FN, H
DTX0010	LIQ_PH-ILD_00000226	LIQ_PH-ILD_00000246	Saggar, R., et al., <i>Changes in right heart haemodynamics and echocardiographic function in an advanced phenotype of pulmonary hypertension and right heart dysfunction associated with pulmonary fibrosis</i> , Thorax 2014;69:123–129 (2014) ("Saggar 2014")	A, C, FN, H, IC
DTX0011	LIQ_PH-ILD_00000247	LIQ_PH-ILD_00000481	Clinical Trial Protocol for Aaron Waxman et al., Inhaled treprostinil in pulmonary hypertension due to interstitial lung disease, 384 N. Eng. J. Med. 325 (2021)	A, C, FN, H, IC
DTX0012	LIQ_PH-ILD_00000482	LIQ_PH-ILD_00000491	Edited Transcript of United Therapeutics Corp. at TD Cowen Health Care Conference (Mar. 5, 2024)	A, C, FN, H, BE
DTX0013	LIQ_PH-ILD_00000503	LIQ_PH-ILD_00000513	Edited Transcript of UTC Q1 2023 Earnings Call	A, C, FN, H, BE
DTX0014	LIQ_PH-ILD_00000514	LIQ_PH-ILD_00000529	Tyvaso DPI Instructions for Use (Nov. 2023), available at https://www.tyvaso.com/pdf/TYVASO-DPI-instructions-for-use.pdf	A, C, FN, FRE 106, H
DTX0015	LIQ_PH-ILD_00000530	LIQ_PH-ILD_00000534	United Therapeutics Announces FDA Acceptance of Tyvaso DPITM New Drug Application for Priority Review (June 16, 2021), available at https://pipeline.unither.com/wp-content/uploads/2021/06/2021-06-16-DPI-accept-FINAL-formatted.pdf	A, C, FN, H
DTX0016	LIQ_PH-ILD_00000535	LIQ_PH-ILD_00000535	Savan Patel et al., Robustness of YutreplaTM, a Dry-Powder Inhaled Formulation of Treprostinil, in Patient Misuse Scenarios, CHEST (Oct. 25, 2022), available at https://investors.liquidia.com/staticfiles/0f869d92-5ad1-4db6-b75d-45149818ec2a	A, C, FN, H
DTX0017	LIQ_PH-ILD_00000536	LIQ_PH-ILD_00000563	Liquidia Corporation Corporate Overview (June 20, 2022), available at https://www.liquidia.com/static-files/be6ab802-4090-4627-ade0-6623b6c09f24	A, C, FN, H
DTX0018	LIQ_PH-ILD_00000564	LIQ_PH-ILD_00000576	United Therapeutics Corporation Reports Fourth Quarter and Full Year 2023 Financial Results (Feb. 21, 2024), available at https://ir.unither.com/press-releases/2024/02-21-2024-110027752	A, C, FN, H

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DTX0019	LIQ_PH-ILD_00000577	LIQ_PH-ILD_00000578	United Therapeutics Corporation Announces \$1 Billion Accelerated Share Repurchase Program (Mar. 25, 2024), available at https://ir.unither.com/press-releases/2024/03-25-2024-110046740	A, C, FN, H
DTX0020	LIQ_PH-ILD_00000579	LIQ_PH-ILD_00000595	Deposition Transcript of Aaron Waxman (excerpted) in <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406 (P.T.A.B. Jan. 8, 2022)	Dep, IE, LC, 403, R
DTX0021	LIQ_PH-ILD_00000596	LIQ_PH-ILD_00000596	Physician endorsed letter advocating for the availability of Yutrepla™ to meet the need of PH-ILD patients	A, C, FN, FRE 106, H
DTX0022	LIQ_PH-ILD_00000597	LIQ_PH-ILD_00000667	Transcript from the March 15, 2024 Deposition of Frederic Selck, Ph.D., <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> (D. Del. 23-975)	Dep, IE, LC
DTX0023	LIQ_PH-ILD_00000668	LIQ_PH-ILD_00000676	Sept. 15, 2021 Deposition Transcript of Dr. Lewis Rubin (excerpted)	Dep, IE, LC, 403, R, IC
DTX0024	LIQ_PH-ILD_00000677	LIQ_PH-ILD_00000791	Deposition Transcript of Dr. Steven D. Nathan in <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 23-975-RGA (D. Del. Mar. 10, 2024)	Dep, IE, LC
DTX0025	LIQ_PH-ILD_00000792	LIQ_PH-ILD_00000800	Testimony of Dr. Aaron Waxman in Trial Transcript Vol. III in <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA (D. Del. Mar. 30, 2022) (excerpted)	Dep, IE, LC, 403, R, IC
DTX0026	LIQ_PH-ILD_00000801	LIQ_PH-ILD_00000840	Joint PTO Ex. 2 - UTC's Statement of Contested Facts, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA, D.I. 322-2 (D. Del. June 1, 2022)	BRPL, IE, LC, 403, R, IC
DTX0027	LIQ_PH-ILD_00000841	LIQ_PH-ILD_00000846	Rebuttal Expert Report of Dr. Andrew Clark, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , C.A. No. 20-755 (RGA) (excerpted)	Expert, H, IE, LC, 403, R, IC
DTX0028	LIQ_PH-ILD_00000847	LIQ_PH-ILD_00000864	UTC Ltr. to K. Dettelbach and B. Cooney (Feb. 12, 2024)	A, C, FN, FRE 106, H
DTX0029	LIQ_PH-ILD_00000865	LIQ_PH-ILD_00000870	Initial Expert Report of Dr. Andrew Clark, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , C.A. No. 20-755 (RGA) (excerpted)	Expert, H, IE, LC, 403, R, IC
DTX0030	LIQ_PH-ILD_00000871	LIQ_PH-ILD_00000878	Opening Report of Aaron Waxman, M.D. Ph.D. in <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA (D. Del. Oct. 15, 2021) (excerpted)	Expert, H, IE, LC, 403, R, IC
DTX0031	LIQ_PH-ILD_00000879	LIQ_PH-ILD_00000895	Deposition Transcript of Andrew Clark, Ph.D. in <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA (D. Del. Jan. 14, 2022) (excerpted)	Dep, IE, LC, 403, R, IC
DTX0032	LIQ_PH-ILD_00000896	LIQ_PH-ILD_00000910	2024 Yutrepla™ Label	A, C, FN, FRE 106, H, IC, OT
DTX0033	LIQ_PH-ILD_00000911	LIQ_PH-ILD_00000917	Reply Expert Report of Aaron Waxman, M.D. Ph.D. in <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA (D. Del. Dec. 10, 2021) (excerpted)	Expert, H, IE, LC, 403, R, IC
DTX0034	LIQ_PH-ILD_00000956	LIQ_PH-ILD_00000987	UTC's Opening Post-Trial Brief, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA, D.I. 408 (D. Del. May 4, 2022)	BRPL, IE, LC, 403, R
DTX0035	LIQ_PH-ILD_00000992	LIQ_PH-ILD_00001017	Plaintiff's Proposed Finding of Fact on Validity, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA, D.I. 414 (D. Del. Jun. 1, 2022)	BRPL, IE, LC, 403, R
DTX0036	LIQ_PH-ILD_00001018	LIQ_PH-ILD_00001072	Trial Opinion, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA, D.I. 433 (D. Del. 2022)	BRPL, IE, LC, 403, R
DTX0037	LIQ_PH-ILD_00001395	LIQ_PH-ILD_00001399	Table of Contents, J. Heart and Lung Transplantation 34(4), Supplement, S1-S368 ("Agarwal TOC")	A, C, FN, H, IC
DTX0038	LIQ_PH-ILD_00001400	LIQ_PH-ILD_00001404	M. Agarwal and A.B. Waxman, Inhaled Treprostinil in Group-3 Pulmonary Hypertension, J. Heart Lung Transplant., 34(3): S343 (2015), available at https://www.jhltonline.org/article/S1053-2498(15)01005-0/fulltext	A, C, FN, H, IC
DTX0039	LIQ_PH-ILD_00001405	LIQ_PH-ILD_00001413	R. Barst, et al, Clinical perspectives with long-term pulsed inhaled nitric oxide for the treatment of pulmonary arterial hypertension, Pulmonary Circulation 2:139 (2012)	A, C, FN, H

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DTX0040	LIQ_PH-ILD_00001414	LIQ_PH-ILD_00001418	R.N. Channick, et al., Safety and Efficacy of inhaled treprostinil as add-on therapy to bosentan in pulmonary arterial hypertension, <i>J. Am. Coll. Cardiol.</i> 48(7):1433 (2006)	A, C, FN, H
DTX0041	LIQ_PH-ILD_00001419	LIQ_PH-ILD_00001425	R. Channick, Pulmonary hypertension: Classification and treatment, <i>Can. J. Cardiology</i> , 26: 5B (2010)	A, C, FN, H
DTX0042	LIQ_PH-ILD_00001426	LIQ_PH-ILD_00001432	Roderick C. Deano et al, <i>Referral of Patients with Pulmonary Hypertension Diagnoses to Tertiary Pulmonary Hypertension Centers</i> , 173 <i>JAMA INTERN. MED.</i> 887 (2013)	A, C, FN, H
DTX0043	LIQ_PH-ILD_00001617	LIQ_PH-ILD_00001627	H. Gall, et al., The Giessen Pulmonary Hypertension Registry: Survival in pulmonary hypertension subgroups, <i>J. Heart Lung Transplant.</i> 36(9):957-967 (2017)	A, C, FN, H
DTX0044	LIQ_PH-ILD_00001628	LIQ_PH-ILD_00001669	Hill 2022 at Supporting Information (Figure S2) available at https://onlinelibrary.wiley.com/doi/10.1002/pul.212119	A, C, FN, H, IC
DTX0045	LIQ_PH-ILD_00001670	LIQ_PH-ILD_00001680	N. Hill et al, INSPIRE: Safety and tolerability of inhaled Yutrepla (treprostinil) in pulmonary arterial hypertension (PAH), <i>Pulm. Circ.</i> 12 e12119 (2022)	A, C, FN, H
DTX0046	LIQ_PH-ILD_00001681	LIQ_PH-ILD_00001681	NCT02630316 Glossary	A, C, FN, FRE 106, H, IC
DTX0047	LIQ_PH-ILD_00001682	LIQ_PH-ILD_00001688	C. Lee et al, Practical considerations in the management of inhaled prostacyclin therapy for pulmonary hypertension associated with interstitial lung disease (WHO group 3), <i>Respiratory Med.</i> 196 (2022)	A, C, FN, H
DTX0048	LIQ_PH-ILD_00001689	LIQ_PH-ILD_00001701	G. Leuschner and J. Behr, Acute Exacerbation in Interstitial Lung Disease, <i>Front. Med.</i> 4:176 (2017)	A, C, FN, H
DTX0049	LIQ_PH-ILD_00002398	LIQ_PH-ILD_00002405	H. Olschewski, et al., Inhaled Prostacyclin and Iloprost in Severe Pulmonary Hypertension Secondary to Lung Fibrosis, <i>Am. J. Respir. Crit. Care. Med.</i> 160:600-607 (1999)	A, C, FN, H
DTX0050	LIQ_PH-ILD_00002406	LIQ_PH-ILD_00002438	OPTINEB® Manual	A, C, FN, FRE 106, H, 403, R
DTX0051	LIQ_PH-ILD_00002439	LIQ_PH-ILD_00002442	Kishan Parikh et al, <i>Safety and Tolerability of High-dose Inhaled Treprostinil in Pulmonary Hypertension</i> , 67 <i>J. CARDIOVASCULAR PHARMACOLOGY</i> 322-25 (2016) ("Parikh 2016")	A, C, FN, H
DTX0052	LIQ_PH-ILD_00002444	LIQ_PH-ILD_00002457	2006 Remodulin Label	A, C, FN, FRE 106, H, IC
DTX0053	LIQ_PH-ILD_00002458	LIQ_PH-ILD_00002461	R. Saggar, F. Abtin, R. Channick, Inhaled Treprostinil in Group 3 Pulmonary Hypertension. <i>N. Engl. J. Med.</i> 384(19):1870 (2021)	A, C, FN, H, IC
DTX0054	LIQ_PH-ILD_00002462	LIQ_PH-ILD_00002473	<i>Eur. Respir. J.</i> Vol. 38 Suppl. 55 Table of Contents	A, C, FN, H, IC
DTX0055	LIQ_PH-ILD_00002474	LIQ_PH-ILD_00002478	A. Schirro and A. Waxman, Inhaled treprostinil therapy in patients with pulmonary hypertension and parenchymal lung disease, <i>Eur. Respir. J.</i> 38:p2385 (2011) Abstract ("Schirro and Waxman 2011")	A, C, FN, H, IC
DTX0056	LIQ_PH-ILD_00002479	LIQ_PH-ILD_00002486	G. Simonneau, et al., Clinical Classification of Pulmonary Hypertension, <i>J. Am. Coll. Cardiol.</i> 43(12):5S-12S (2004)	A, C, FN, H
DTX0057	LIQ_PH-ILD_00002487		V. Tapson, et al., Efficacy in Patient Subgroups in the INCREASE Trial, a Phase III Trial to Evaluate Inhaled Treprostinil in Patients with Pulmonary Hypertension Due to Parenchymal Lung Disease, <i>Arthritis Reumatol.</i> 73 (suppl. 9) (2021) ("Tapson 2021")	A, C, FN, H, IC
DTX0058	LIQ_PH-ILD_00002539	LIQ_PH-ILD_00002546	A. W. Trammell, et al., Use of pulmonary arterial hypertension-approved therapy in the treatment of non-group 1 pulmonary hypertension at US referral centers, <i>Pulm. Circ.</i> 5(2): 356-363 (2015) ("Trammel 2015")	A, C, FN, H
DTX0059	LIQ_PH-ILD_00002547	LIQ_PH-ILD_00002638	Tyvaso Inhalation System Manual (2022)	A, C, FN, FRE 106, H

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DTX0060	LIQ_PH-ILD_00002641	LIQ_PH-ILD_00002665	U.S. Patent No. 10,376,525	403, IC, BE, C, FN, R
DTX0061	LIQ_PH-ILD_00002666	LIQ_PH-ILD_00002688	U.S. Patent Publication No. 2008/0200449	403, IC, BE, C, FN, R
DTX0062	LIQ_PH-ILD_00002689	LIQ_PH-ILD_00002712	U.S. Patent No. 9,339,507	403, IC, BE, C, FN, R
DTX0063	LIQ_PH-ILD_00002713	LIQ_PH-ILD_00002736	U.S. Patent No. 9,358,240	403, IC, BE, C, FN, R
DTX0064	LIQ_PH-ILD_00002737	LIQ_PH-ILD_00002787	U.S. Patent No. 11,826,327	403, IC, BE, C, FN, R
DTX0065	LIQ_PH-ILD_00002935	LIQ_PH-ILD_00002985	VENTANEB® Manual	A, C, FN, FRE 106, H
DTX0066	LIQ_PH-ILD_00002986	LIQ_PH-ILD_00002989	R. Saggar, et al., <i>Treprostinil to Reverse Pulmonary Hypertension Associated with Idiopathic Pulmonary Fibrosis as a Bridge to Single-Lung Transplantation</i> , J. Heart and Lung Transplant. 28:964-7 (2009) ("Saggar 2009")	A, C, FN, H
DTX0067	LIQ_PH-ILD_00015817	LIQ_PH-ILD_00015829	2002 Remodulin Label	A, C, FN, FRE 106, H, IC
DTX0068	LIQ_PH-ILD_00017040	LIQ_PH-ILD_00017051	B. LeVarge and R. Channick, Inhaled Treprostinil for the Treatment of Pulmonary Arterial Hypertension, 6:3 Expert Review of Resp. Med. 255-265 (2014)	A, C, FN, H
DTX0069	LIQ_PH-ILD_00021108	LIQ_PH-ILD_00021121	2016 Tyvaso® Label	A, C, FN, FRE 106, H
DTX0070	LIQ_PH-ILD_00021122	LIQ_PH-ILD_00021142	2015 Uptravi Label	A, C, FN, FRE 106, H, R
DTX0071	LIQ_PH-ILD_00043078	LIQ_PH-ILD_00043085	Faria-Urbina, et al., Inhaled Treprostinil in Pulmonary Hypertension Associated with Lung Disease, Lung 196:139-146 (2018)	A, C, FN, H
DTX0072	LIQ_PH-ILD_00044770	LIQ_PH-ILD_00044783	2017 Tyvaso® Label	A, C, FN, FRE 106, H, IC
DTX0073	LIQ_PH-ILD_00085434	LIQ_PH-ILD_00085448	2021 Tyvaso® Label	A, C, FN, FRE 106, H, IC
DTX0074	LIQ_PH-ILD_00100754	LIQ_PH-ILD_00100788	2021 Yutrepla Tentative Approval Letter and Label	A, C, FN, FRE 106, H
DTX0075	LIQ_PH-ILD_00101207	LIQ_PH-ILD_00101219	Decision Affirming Final Written Decision in IPR2021-00406, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 23-1805 (Fed. Cir. Dec. 20, 2023)	BRPL, IE, LC, 403, R
DTX0076	LIQ_PH-ILD_00101296	LIQ_PH-ILD_00101300	<i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , C.A. No. 1:20-cv-755-RGA-JLH, D.I. 403 Trial Transcript (D. Del. March 29, 2022) (excerpted)	Dep, IE, LC, 403, R, IC
DTX0077	LIQ_PH-ILD_00101301	LIQ_PH-ILD_00101318	A. Waxman, The iTRE Study: Therapeutic Opportunity for Inhaled Treprostinil in Patients with PH Secondary to Primary Pulmonary Vascular Disease, UTHR Science Day 2018 (2018)	A, C, FN, IC, 403, BE, H
DTX0078	LIQ_PH-ILD_00101319	LIQ_PH-ILD_00101320	UTC Press Release, August 31, 2022: UNITED THERAPEUTICS PREVAILS IN DRY POWDER INHALER PATENT LITIGATION	A, C, FN, H
DTX0079	LIQ_PH-ILD_00101321	LIQ_PH-ILD_00101322	UTC Press Release, July 24, 2023: United Therapeutics Wins Appeal in Dry Powder Inhaler Patent Litigation	A, C, FN, H
DTX0080	LIQ_PH-ILD_00101323	LIQ_PH-ILD_00101328	'887 patent IDS filed October 7, 2019	403, IC, BE, C, FN, R
DTX0081	LIQ_PH-ILD_00101329	LIQ_PH-ILD_00101346	Decision Denying Patent Owner's Request for Rehearing, IPR2021-00406 (P.T.A.B. Feb. 2, 2023)	BRPL, IE, LC, 403, R
DTX0082	LIQ_PH-ILD_00101347	LIQ_PH-ILD_00101390	Decision Granting Institution of <i>Inter Partes</i> Review, <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406, Paper 18	BRPL, IE, LC, 403, R
DTX0083	LIQ_PH-ILD_00101391	LIQ_PH-ILD_00101445	Trial Opinion, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 20-755-RGA, D.I. 433	BRPL, IE, LC, 403, R
DTX0084	LIQ_PH-ILD_00101446	LIQ_PH-ILD_00101468	Federal Circuit Decision, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , Nos. 22-2217, 23-1021 (Fed. Cir. July 24, 2023)	BRPL, IE, LC, 403, R
DTX0085	LIQ_PH-ILD_00101469	LIQ_PH-ILD_00101517	Final Written Decision, <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406, Paper 78	BRPL, IE, LC, 403, R

DTX0086	LIQ_PH-ILD_00101518	LIQ_PH-ILD_00101523	Robert P. Frantz et al, Baseline NT-proBNP correlates with change in 6-minute walk distance in patients with pulmonary arterial hypertension in the pivotal inhaled treprostинil study TRIUMPH-1, 31 J. Heart & Lung Transplantation 811, 812 (2012), https://www.jhltonline.org/article/S1053-2498(12)01076-5/fulltext	A, C, FN, H
DTX0087	LIQ_PH-ILD_00101524	LIQ_PH-ILD_00101617	Transcript from Oral Hearing, <i>Liquidia Technologies, Inc. v. United Therapeutics Corp.</i> , IPR2021-00406 (May 13, 2023)	Dep, IE, LC, R
DTX0088	LIQ_PH-ILD_00101618	LIQ_PH-ILD_00101698	Petition for Inter Partes Review, <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406	BRPL, IE, LC, 403, R
DTX0089	LIQ_PH-ILD_00101699	LIQ_PH-ILD_00101703	Patent Owner's Notice of Appeal, <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406	BRPL, IE, LC, 403, R
DTX0090	LIQ_PH-ILD_00101704	LIQ_PH-ILD_00101705	Orange Book Listing for TYVASO®	A, C, FN, FRE 106, H, IC
DTX0091	LIQ_PH-ILD_00101706	LIQ_PH-ILD_00101707	Orange Book Listing for TYVASO DPI®	A, C, FN, FRE 106, H, IC
DTX0092	LIQ_PH-ILD_00101708	LIQ_PH-ILD_00101712	Order Denying Request for Precedential Opinion Panel, <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406	BRPL, IE, LC, 403, R
DTX0093	LIQ_PH-ILD_00101713	LIQ_PH-ILD_00101718	Patent Owner Mandatory Notices, <i>Liquidia Techs., Inc. v. United Therapeutics Corp.</i> , IPR2021-00406	BRPL, IE, LC, 403, R
DTX0094	LIQ_PH-ILD_00101719	LIQ_PH-ILD_00101743	U.S. Patent No. 10,376,525	403, IC, BE, C, FN, R
DTX0095	LIQ_PH-ILD_00101769	LIQ_PH-ILD_00101791	U.S. Patent App. Pub. 2008/0200449	403, IC, BE, C, FN, R
DTX0096	LIQ_PH-ILD_00101792	LIQ_PH-ILD_00101802	U.S. Patent App. Pub. 2019/0321290	403, IC, BE, C, FN, R
DTX0097	LIQ_PH-ILD_00101803	LIQ_PH-ILD_00101826	U.S. Patent No. 9,339,507	403, IC, BE, C, FN, R
DTX0098	LIQ_PH-ILD_00101827	LIQ_PH-ILD_00101850	U.S. Patent No. 9,358,240	403, IC, BE, C, FN, R
DTX0099	LIQ_PH-ILD_00101851	LIQ_PH-ILD_00101852	UTC Entry of Appearance, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 23-1805 (Fed. Cir.)	BRPL, IE, LC, 403, R
DTX0100	LIQ_PH-ILD_00101853	LIQ_PH-ILD_00102031	UTC's Opening Brief (D.I. 17), <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 23-1805 (Fed. Cir.)	BRPL, IE, LC, 403, R
DTX0101	LIQ_PH-ILD_00102032	LIQ_PH-ILD_00102087	<i>Liquidia Technologies, Inc. v. United Therapeutics Corp.</i> , IPR2021-00406, Declaration of Aaron Waxman, M.D., PH.D (Nov. 10, 2021)	Expert, H, IE, LC, 403, R
DTX0102	LIQ_PH-ILD_00113392	LIQ_PH-ILD_00113400	IND 129819 Type B Pre-sNDA Meeting Minutes (WRO)	A, C, FN, FRE 106, H
DTX0103	LIQ_PH-ILD_00113964	LIQ_PH-ILD_00113978	Executive Summary of Pulmonary Arterial Hypertension (PAH). Expert Input Meeting Physicians, Liquidia Technologies Inc. (May 27, 2020)	A, C, FN, IC, 403, BE, H
DTX0104	LIQ_PH-ILD_00116494	LIQ_PH-ILD_00116520	Liquidia Steering Committee Meeting, November 30, 2022	A, C, FN, IC, 403, BE, H
DTX0105	LIQ_PH-ILD_00118028	LIQ_PH-ILD_00118028	Yutrepla Tyvaso DPI Points of Differentiation.xlsx	A, C, FN, IC, 403, BE, H
DTX0106	LIQ_PH-ILD_00120765	LIQ_PH-ILD_00120835	Liquidia PAH Expert Advisory Board Meeting, May 14, 2022	A, C, FN, IC, 403, BE, H
DTX0107	LIQ_PH-ILD_00120848	LIQ_PH-ILD_00120852	Internal Training Proposal (Raleigh: Week of March 20th)	A, C, FN, IC, 403, BE, H
DTX0108	LIQ_PH-ILD_00121665	LIQ_PH-ILD_00121746	Liquidia PAH Nurse Advisory Board Meeting, June 9, 2022	A, C, FN, IC, 403, BE, H
DTX0109	LIQ_PH-ILD_00121761	LIQ_PH-ILD_00121908	PH-ILD Advisory Board, Washington DC, May 20th, 2023	A, C, FN, IC, 403, BE, H
DTX0110	LIQ_PH-ILD_00122293	LIQ_PH-ILD_00122437	PH-ILD Advisory Board, Washington DC, May 20th, 2023	A, C, FN, IC, 403, BE, H
DTX0111	LIQ_PH-ILD_00122627	LIQ_PH-ILD_00122652	Liquidia PH-ILD Advisory Board Executive Summary – May 20, 2023	A, C, FN, IC, 403, BE, H
DTX0112	LIQ_PH-ILD_00122745	LIQ_PH-ILD_00122754	Waxman et al., <i>Inhaled Treprostинil in Pulmonary Hypertension Due to Interstitial Lung Disease</i> , 384 N. Engl. J. Med. 325 (2023) ("Waxman 2021")	A, C, FN, H
DTX0113	LIQ_PH-ILD_00122811	LIQ_PH-ILD_00122893	Protocol LTI-401 ILD only 20230619.docx	A, C, FN, FRE 106, H, IC, OT
DTX0114	LIQ_PH-ILD_00123656	LIQ_PH-ILD_00123656	AE Comparison Yutrepla vs PGIs 2023.08.04 1030.xlsx	A, C, FN, IC, 403, BE, H
DTX0115	LIQ_PH-ILD_00123657	LIQ_PH-ILD_00123658	Comparing Yutrepla Tyvaso DPI labels 2023.08.04 1030.pptx	A, C, FN, IC, 403, BE, H
DTX0116	LIQ_PH-ILD_00124867	LIQ_PH-ILD_00124957	An Open-Label Prospective Multicenter Study to Evaluate Safety and Tolerability of Dry Powder Inhaled Treprostинil in Pulmonary Hypertension	A, C, FN, FRE 106, H

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DTX0117	LIQ_PH-ILD_00125266	LIQ_PH-ILD_00125348	Liquidia Board of Directors Meeting, Nov. 11, 2021	A, C, FN, IC, 403, BE, H
DTX0118	LIQ_PH-ILD_00126017	LIQ_PH-ILD_00126055	NDA 213005 Tentative Approval FDA Letter	A, C, FN, FRE 106, H
DTX0119	LIQ_PH-ILD_00126056	LIQ_PH-ILD_00126095	FDA Correspondence re NDA 213005, Aug. 16, 2024	A, C, FN, FRE 106, H
DTX0120	LIQ_PH-ILD_00130594	LIQ_PH-ILD_00130619	Liquidia Board of Directors Meeting, Aug 2, 2023	A, C, FN, IC, 403, BE, H
DTX0121	LIQ_PH-ILD_00130620	LIQ_PH-ILD_00130645	Liquidia Board of Directors Meeting, Aug 2, 2023	A, C, FN, IC, 403, BE, H
DTX0122	LIQ_PH-ILD_00133864	LIQ_PH-ILD_00133870	First Amendment to Consulting Agreement between Liquidia and Rajan Saggar, Nov. 9, 2022	A, FN, H, 403, R
DTX0123	LIQ_PH-ILD_00133871	LIQ_PH-ILD_00133888	Consulting Agreement for Healthcare Professionals between Liquidia and Rajan Saggar, Nov. 10, 2021	A, FN, H, 403, R
DTX0124	LIQ_PH-ILD_00133889	LIQ_PH-ILD_00133905	Consulting Agreement for Healthcare Professionals for Rajan Saggar, Feb. 20, 2024	A, FN, H, 403, R
DTX0125	LIQ_PH-ILD_00134026		Liquidia Meeting Request, IND 129819	A, C, FN, FRE 106, H
DTX0126	LIQ_PH-ILD_00134042	LIQ_PH-ILD_00134042	Liquidia letter to FDA re IND 129819, SN0091 Type B Pre-sNDA Meeting Request, April 8, 2022	A, C, FN, FRE 106, H
DTX0127	LIQ_PH-ILD_00140569	LIQ_PH-ILD_00140622	Thomson Reuters Streetevents Edited Transcript UTHR – United Therapeutics Corp to Host Science Day 2018, September 24, 2018	A, C, FN, H, BE
DTX0128	LIQ_PH-ILD_00144796	LIQ_PH-ILD_00144798	Email exchange with R. Saggar re Dr. Saggar Advocacy Letter, March 28, 2024	A, C, FN, IC, 403, BE, H, 403, R
DTX0129	LIQ_PH-ILD_00146716	LIQ_PH-ILD_00146745	Liquidia PH-ILD Screening, Diagnosis, and Future Research Presentation	A, C, FN, IC, 403, BE, H
DTX0130	LIQ_PH-ILD_00146970	LIQ_PH-ILD_00146983	YutrepiaTM Formulary Kit	A, C, FN, FRE 106, H
DTX0131	LIQ_PH-ILD_00146984	LIQ_PH-ILD_00147052	YutrepiaTM Product Dossier	A, C, FN, FRE 106, H
DTX0132	LIQ_PH-ILD_00147068	LIQ_PH-ILD_00147069	YutrepiaTM CuraScript Pamphlet	A, C, FN, FRE 106, H
DTX0133	LIQ_PH-ILD_00147176	LIQ_PH-ILD_00147177	YutrepiaTM Starter Kit Insert	A, C, FN, FRE 106, H
DTX0134	LIQ_PH-ILD_00147178	LIQ_PH-ILD_00147184	YutrepiaTM Patient Brochure	A, C, FN, FRE 106, H
DTX0135	LIQ_PH-ILD_00147196	LIQ_PH-ILD_00147310	YutrepiaTM Provider Presentation	A, C, FN, FRE 106, H
DTX0136	LIQ_PH-ILD_00147313	LIQ_PH-ILD_00147313	Forecast Scenario Comparisons - 05.03.2024.xlsx	A, C, FN, IC, 403, BE, H, U, MIS
DTX0137	LIQ_PH-ILD_00147314	LIQ_PH-ILD_00147321	Manyoo Agarwal & Aaron B. Waxman, <i>Inhaled Treprostinil in Group-3 Pulmonary Hypertension</i> , 34 J. HEART & LUNG TRANSPLANT. S343 (2015) ("Agarwal 2015")	A, C, FN, H, IC
DTX0138	LIQ_PH-ILD_00147322	LIQ_PH-ILD_00147322	A. Waxman, "Is there a therapeutic opportunity for prostacyclins in patients with pulmonary hypertension secondary to primary pulmonary disease?," 12th Annual John Vain Memorial Symposium, March 17, 2017, https://vimeo.com/218433991/157aa6fb84?share=copy ("2017 Waxman Presentation")	A, C, FN, H, 403
DTX0139	LIQ_PH-ILD_00147323	LIQ_PH-ILD_00147327	12th John Vance Memorial Symposium on Prostacyclin Science and Pulmonary Vascular Disease, 17-18 March 2017	A, C, FN, H
DTX0140	LIQ_PH-ILD_00147328	LIQ_PH-ILD_00147354	A. Waxman, "Is there a therapeutic opportunity for prostacyclins in patients with pulmonary hypertension secondary to primary pulmonary disease?," 12th Annual John Vain Memorial Symposium, March 17, 2017	A, C, FN, H, BE
DTX0141	LIQ_PH-ILD_00147359	LIQ_PH-ILD_00147359	U.S. Patent Application No. 17/486,721, Sept. 27, 2021 Notification of Related Proceedings	403, IC, BE, C, FN, R
DTX0142	LIQ_PH-ILD_00147360	LIQ_PH-ILD_00147361	U.S. Patent Application No. 17/486,721, Claims	403, IC, BE, C, FN, R
DTX0143	LIQ_PH-ILD_00147377	LIQ_PH-ILD_00147405	U.S. Patent Application No. 17/486,721, Specification	403, IC, BE, C, FN, R
DTX0144	LIQ_PH-ILD_00147437	LIQ_PH-ILD_00147437	U.S. Patent Application No. 17/486,721, March. 2, 2022 Notification of Related Proceedings	403, IC, BE, C, FN, R

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DTX0145	LIQ_PH-ILD_00147452	LIQ_PH-ILD_00147453	U.S. Patent Application No. 17/707,651, March 29, 2022 Notification of Related Proceedings	403, IC, BE, C, FN, R
DTX0146	LIQ_PH-ILD_00147453	LIQ_PH-ILD_00147454	U.S. Patent Application No. 17/707,651, Claims	403, IC, BE, C, FN, R
DTX0147	LIQ_PH-ILD_00147455	LIQ_PH-ILD_00147483	U.S. Patent Application No. 17/707,651, Specification	403, IC, BE, C, FN, R
DTX0148	LIQ_PH-ILD_00147486	LIQ_PH-ILD_00147487	U.S. Patent Application No. 17/707,651, July 21, 2022 Notification of Related Proceedings	403, IC, BE, C, FN, R
DTX0149	LIQ_PH-ILD_00147502	LIQ_PH-ILD_00147502	Nov. 13, 2023 Letter from Dr. Jennifer Weidman, VP of Regulatory Affairs at Liquidia, to Dr. Norman Stockbridge of the FDA	A, C, FN, FRE 106, H
DTX0150	LIQ_PH-ILD_00147503	LIQ_PH-ILD_00147506	Nov. 2, 2023 Investigational New Drug Application	A, C, FN, FRE 106, H
DTX0151	LIQ_PH-ILD_00147507	LIQ_PH-ILD_00147507	Nov. 2, 2023 Letter from Dr. Jennifer Weidman, VP of Regulatory Affairs at Liquidia, to Dr. Norman Stockbridge of the FDA	A, C, FN, FRE 106, H
DTX0152	LIQ_PH-ILD_00147508	LIQ_PH-ILD_00147508	us-regional.xml	IC, IE, NI, FN, OT, R
DTX0153	LIQ_PH-ILD_00147509	LIQ_PH-ILD_00147509	Description of Electronic Submission	A, C, FN, FRE 106, H
DTX0154	LIQ_PH-ILD_00147510	LIQ_PH-ILD_00147600	LTI-401 Clinical Research Protocol	IC, NI, FN, R, 403, A, H
DTX0155	LIQ_PH-ILD_00147601	LIQ_PH-ILD_00147601	IND129819 Submission Receipt	A, C, FN, FRE 106, H
DTX0156	LIQ_PH-ILD_00147602	LIQ_PH-ILD_00147605	Nov. 13, 2023 Investigational New Drug Application	A, C, FN, FRE 106, H
DTX0157	LIQ_PH-ILD_00147606	LIQ_PH-ILD_00147606	Nov. 13, 2023 Letter from Dr. Jennifer Weidman, VP of Regulatory Affairs at Liquidia, to Dr. Norman Stockbridge of the FDA	A, C, FN, FRE 106, H
DTX0158	LIQ_PH-ILD_00147607	LIQ_PH-ILD_00147697	First Amended ASCENT Protocol	IC, NI, FN, R, 403, A, H
DTX0159	LIQ_PH-ILD_00147698	LIQ_PH-ILD_00147698	Description of Electronic Submission	A, C, FN, FRE 106, H
DTX0160	LIQ_PH-ILD_00147699	LIQ_PH-ILD_00147699	IND129819 Submission Receipt	A, C, FN, FRE 106, H
DTX0161	LIQ_PH-ILD_00148501	LIQ_PH-ILD_00148508	M. Agarwal and A.B. Waxman, Inhaled Treprostinil in Group-3 Pulmonary Hypertension, <i>J. Heart and Lung Transplant.</i> 34(4):S343 (2015)	A, C, FN, H, IC
DTX0162	LIQ_PH-ILD_00148554	LIQ_PH-ILD_00148560	NDA Safety Update	A, C, FN, FRE 106, H, IC
DTX0163	LIQ_PH-ILD_00148561	LIQ_PH-ILD_00148562	Nov. 22, 2024 Request for Final Approval	A, C, FN, FRE 106, H
DTX0164	LIQ_PH-ILD_00148567	LIQ_PH-ILD_00148605	Anna R. Hemnes et al, <i>Clinical Characteristics and Transplant-Free Survival Across the Spectrum of Pulmonary Vascular Disease</i> , 80 <i>J. AM. COLLEGE CARDIOLOGY</i> 697 (2022)	A, C, FN, H
DTX0165	LIQ_PH-ILD_00148606	LIQ_PH-ILD_00148626	Gabor Kovacs et al, <i>Definition, classification and diagnosis of pulmonary hypertension</i> , 64 <i>EUR. RESPIR. J.</i> (2024) ("Kovacs 2024")	A, C, FN, H
DTX0166	LIQ_PH-ILD_00148627	LIQ_PH-ILD_00148635	Cottin, Vincent et al., Fibrosing Interstitial Lung Diseases: Knowns and Unknowns, <i>Eur. Respir. Rev.</i> 2019;28 180100 (2019)	A, C, FN, H
DTX0167	LIQ_PH-ILD_00148636	LIQ_PH-ILD_00148637	Brian P. O'Sullivan, <i>Importance of Off-Label Options for Treating Serious Lung Diseases</i> , 13 <i>ANNALS AM. THORACIC SOCIETY</i> 1879 (2016) ("Sullivan 2016")	A, C, FN, H
DTX0168	LIQ_PH-ILD_00148663	LIQ_PH-ILD_00148670	Trenton D. Nauser, <i>Pulmonary Hypertension: New Perspectives</i> , 9 <i>CONGEST HEART FAILURE</i> 155-162 (2003)	A, C, FN, H
DTX0169	LIQ_PH-ILD_00148671	LIQ_PH-ILD_00148694	Nicholas S. Hill et al, <i>New Therapeutic Paradigms and Guidelines in the Management of Pulmonary Arterial Hypertension</i> , <i>J. MANAGED CARE & SPECIALTY PHARMACY</i> , Supplement Vol. 22, S3-S21 (Mar. 2016) ("Hill 2016")	A, C, FN, H
DTX0170	LIQ_PH-ILD_00148695	LIQ_PH-ILD_00148707	2014 Tyvaso® Label	A, C, FN, FRE 106, H, 403
DTX0171	LIQ_PH-ILD_00148708	LIQ_PH-ILD_00148719	Nicholas Hill et al, <i>Inhaled Therapies for Pulmonary Hypertension</i> , 60 <i>RESPIRATORY CARE</i> 794-802 (2015)	A, C, FN, H
DTX0172	LIQ_PH-ILD_00148720	LIQ_PH-ILD_00148725	Jean-Luc Vachiéry et al, <i>Transitioning from i.v. epoprostenol to subcutaneous treprostinil in pulmonary arterial hypertension</i> , 121 <i>CHEST</i> 1561 (2002)	A, C, FN, H

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DTX0173	LIQ_PH-ILD_00148726	LIQ_PH-ILD_00148731	Steven D. Nathan et al, <i>Study design and rationale for the TETON phase 3, randomised, controlled clinical trials of inhaled treprostinil in the treatment of idiopathic pulmonary fibrosis</i> , 9 BMJ OPEN ACCESS RES. 1 (2022)	A, C, FN, H
DTX0174	LIQ_PH-ILD_00148732	LIQ_PH-ILD_00148744	Marc Humbert et al, <i>Treatment of Pulmonary Arterial Hypertension</i> , 351 N. ENG. J. MED. 1425-436 (2004) ("Humbert 2004")	A, C, FN, H
DTX0175	LIQ_PH-ILD_00148745	LIQ_PH-ILD_00148745	FDA Adverse Event Reporting System (available at https://fis.fda.gov/sense/app/95239e26-e0be-42d9-a960-9a5f7f1c25ee/sheet/6b5a135f-f451-45be-893d-20aaee34e28e/state/analysis)	A, C, FN, FRE 106, H, 403, IC, R
DTX0176	LIQ_PH-ILD_00148746	LIQ_PH-ILD_00148746	Steven D. Nathan et al, <i>Study design and rationale for the TETON-PPF Clinical Trial of Inhaled Treprostinil for the Treatment of Progressive Pulmonary Fibrosis</i> , 209 AM. J. RESPIRATORY CRITICAL CARE MED. A3760 (2024)	A, C, FN, H
DTX0177	LIQ_PH-ILD_00148828	LIQ_PH-ILD_00148839	GBD 2021 Pulmonary Arterial Hypertension Collaborators, <i>Global, regional, and national burden of pulmonary arterial hypertension, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021</i> , LANCET RESPIRATORY MED. (2024)	A, C, FN, H
DTX0178	LIQ_PH-ILD_00148884	LIQ_PH-ILD_00148890	David B. Badesch et al., <i>ARIES-3: Ambrisentan Therapy in a Diverse Population of Patients with Pulmonary Hypertension</i> , 30 CARDIOVASCULAR THERAPEUTICS 93 (2012)	A, C, FN, H
DTX0179	LIQ_PH-ILD_00148891	LIQ_PH-ILD_00148903	Hoeper, M.M., et al., <i>Temporal trends in pulmonary arterial hypertension: results from the COMPERA registry</i> , European Respiratory Journal 59(6): 2102024 (2022)	A, C, FN, H
DTX0180	LIQ_PH-ILD_00148904	LIQ_PH-ILD_00148910	American Thoracic Society Statement. Guideline for the six-minute walk test. Am J Respir Crit Care Med 2002;166:111-17	A, C, FN, H
DTX0181	LIQ_PH-ILD_00148911	LIQ_PH-ILD_00148919	Frequently Asked Questions on Patents and Exclusivity, fda.gov, https://www.fda.gov/drugs/development-approval-process-drugs/frequently-asked-questions-patents-and-exclusivity	A, C, FN, H, OT
DTX0182	LIQ_PH-ILD_00148920	LIQ_PH-ILD_00148929	Chandra, R.V., et al., Vertebroplasty and Kyphoplasty for Osteoporotic Vertebral Fractures: What are the Latest Data?, AJNR Am J Neuroradiol 2018, 39 (5) 798-806	A, C, FN, H
DTX0183	LIQ_PH-ILD_00148930	LIQ_PH-ILD_00148938	Marco Matucci-Cerinic et al., <i>Clinical trials in systemic sclerosis: lessons learned and outcomes</i> , 9 ARTHRITIS RESEARCH & THERAPY S7 (2007)	A, C, FN, H
DTX0184	LIQ_PH-ILD_00148939	LIQ_PH-ILD_00148945	Chambers, J.D, et al. (2018). Specialty Drug Coverage Varies Across Commercial Health Plans in the US, Health Affairs 37(7): 1041-1047	A, C, FN, H
DTX0185	LIQ_PH-ILD_00148946	LIQ_PH-ILD_00148953	Talmadge E. King et al., <i>Build-3: A Randomized, Controlled Trial of Bosentan in Idiopathic Pulmonary Fibrosis</i> , 184 AM. J. RESPPIR. & CRITICAL CARE MED. 92 (2011).	A, C, FN, H
DTX0186	LIQ_PH-ILD_00148954	LIQ_PH-ILD_00148954	Ganesh Raghu et al., <i>ARTEMIS-IPF: A Placebo-Controlled Trial Of Ambrisentan In Idiopathic Pulmonary Fibrosis</i> , 185 AM. J. RESPPIR. & CRITICAL CARE MED. A3632 (2012)	A, C, FN, H, OT
DTX0187	LIQ_PH-ILD_00148955	LIQ_PH-ILD_00148961	Dry-powder Tyvaso Found More Convenient Than Nebulizer for PAH Patients, 2021-02-01, https://pulmonaryhypertensionnews.com/news/tyvaso-dpi-dry-powder-formulation-likely-more-convenient-pah-patients-than-nebulizer/	A, C, FN, H
DTX0188	LIQ_PH-ILD_00148962	LIQ_PH-ILD_00148987	DMEPOS Quality Standards, cms.gov https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/DMEPOSQuality/DMEPOSQualBooklet-905709.html#	A, C, FN, H

DTX0189	LIQ_PH-ILD_00148988	LIQ_PH-ILD_00148999	Hendriks, P.M, et al. (2022). The evolution of survival of pulmonary arterial hypertension over 15 years. <i>Pulm Circ.</i> 12(4):e12137	A, C, FN, H
DTX0190	LIQ_PH-ILD_00149000	LIQ_PH-ILD_00149010	A Tool to Make FDA Drug Approval Practices Transparent, 2019-01-16, https://anderson-review.ucla.edu/fda-flexibility/	A, C, FN, H
DTX0191	LIQ_PH-ILD_00149011	LIQ_PH-ILD_00149014	Medicaid Coverage of Durable Medical Equipment: Basics for People with Asthma, American Lung Association https://www.lung.org/getmedia/c6bf51c3-9ed8-4c50-9eb5-57a5d7166398/medicaid-dme-primer-v2.pdf	A, C, FN, H
DTX0192	LIQ_PH-ILD_00149015	LIQ_PH-ILD_00149106	Examination of Clinical Trial Costs and Barriers for Drug Development, ERG, Contract No. HHS-P23320095634WC with the U.S. Department of Health and Human Services, 2014-07-25	A, C, FN, H
DTX0193	LIQ_PH-ILD_00149107	LIQ_PH-ILD_00149180	Karshtedt, D. (2021). Nonobviousness: Before & After. <i>Iowa Law Review</i> 106(4):1609-1682	A, C, FN, H
DTX0194	LIQ_PH-ILD_00149181	LIQ_PH-ILD_00149181	Kesselheim, A., et al. Determinants of Market Exclusivity for Prescription Drugs in the United States. <i>JAMA Intern Med.</i> 2017 Nov 1;177(11):1658-1664, Abstract	A, C, FN, H, IC
DTX0195	LIQ_PH-ILD_00149182	LIQ_PH-ILD_00149190	How to overcome clinical trial challenges, 2024-04-26 at https://www.labiatech.eu/in-depth/how-to-overcome-clinical-trial-challenges/	A, C, FN, H
DTX0196	LIQ_PH-ILD_00149240	LIQ_PH-ILD_00149243	Learn what Medigap Covers, medicare.gov https://www.medicare.gov/health-drug-plans/medigap/basics/coverage	A, C, FN, H, IC
DTX0197	LIQ_PH-ILD_00149253	LIQ_PH-ILD_00149260	Hernandez, I. and Hung, A. (2024). A primer on brand-name prescription drug reimbursement in the United States, <i>J Manag Care Spec Pharm</i> 30(1):99-106	A, C, FN, H
DTX0198	LIQ_PH-ILD_00149309	LIQ_PH-ILD_00149320	Frost, A.E., et al., <i>Demographics and outcomes of patients diagnosed with pulmonary hypertension with pulmonary capillary wedge pressures 16 to 18 mm Hg: insights from the REVEAL Registry</i> , 143(1):185-195 (2013)	A, C, FN, H
DTX0199	LIQ_PH-ILD_00149349	LIQ_PH-ILD_00149372	Medicare Coverage of Durable Medical Equipment & Other Devices, Medicare Booklet, https://www.medicare.gov/publications/11045-medicare-coverage-of-dme-and-other-devices.pdf	A, C, FN, H
DTX0200	LIQ_PH-ILD_00149454	LIQ_PH-ILD_00149455	Search Orphan Drug Designations and Approvals, accessdata.fda.gov, https://www.accessdata.fda.gov/scripts/opdlisting/oopd/detailedIndex.cfm?cfgridkey=189104	A, C, FN, H, OT, IC
DTX0201	LIQ_PH-ILD_00149467	LIQ_PH-ILD_00149486	Steven D. Nathan et al., <i>Shining a spotlight on pulmonary hypertension associated with interstitial lung disease care: The latest advances in diagnosis and treatment</i> , 31 J. MANAGED CARE & SPECIALTY PHARM. S2 (2025)	A, C, FN, H, IO, 403
DTX0202	LIQ_PH-ILD_00149487	LIQ_PH-ILD_00149496	Price, S.M., et al., (2021). What influences healthcare providers' prescribing decisions? Results from a national survey. <i>Research in Social and Administrative Pharmacy</i>	A, C, FN, H
DTX0203	LIQ_PH-ILD_00149497	LIQ_PH-ILD_00149511	Shi, M-M, et al., Is there Really No Benefit of Vertebroplasty for Osteoporotic Vertebral Fractures? A Meta-analysis, <i>Clin Orthop Relat Res</i> (2012) 470:2785-2799	A, C, FN, H
DTX0204	LIQ_PH-ILD_00149512	LIQ_PH-ILD_00149514	The Interplay Between U.S. Pharmaceutical Patents and FDA Law, Dec. 2010, https://www.finnegan.com/en/insights/articles/the-interplay-between-u-s-pharmaceutical-patents-and-fda-law.html	A, C, FN, H, IO, LC, 403

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DTX0205	LIQ_PH-ILD_00149546	LIQ_PH-ILD_00149577	Singh, S.J. et al., <i>An official systematic review of the European Respiratory Society/American Thoracic Society: measurement properties of field walking tests in chronic respiratory disease</i> , Eur Respir J 2014; 44: 1447–1478 (2014) ("Singh 2014")	A, C, FN, H
DTX0206	LIQ_PH-ILD_00149578	LIQ_PH-ILD_00149597	The Hatch-Waxman Act: A Primer, Congressional Research Service Report, 2016-09-28	A, C, FN, H, IO, LC, 403
DTX0207	LIQ_PH-ILD_00149598	LIQ_PH-ILD_00149612	Strongin, R.J. (2000). Pharmaceutical Marketplace Dynamics. Washington (DC): National Health Policy Forum. (Issue Brief, No. 755)	A, C, FN, H
DTX0208	LIQ_PH-ILD_00149613	LIQ_PH-ILD_00149687	Merges, R.P. (1988). Commercial Success and Patent Standards: Economic Perspectives on Innovation. Cal. L. Rev. 75(803)	A, C, FN, H, IO, 403
DTX0209	LIQ_PH-ILD_00149688	LIQ_PH-ILD_00149777	Evaluation Research Approval Package for Tyvaso, 2021-03-31, https://www.accessdata.fda.gov/drugsatfda_docs/nda/2021/022387Orig1s017.pdf	A, C, FN, FRE 106, H
DTX0210	LIQ_PH-ILD_00149778	LIQ_PH-ILD_00150039	Liquidia Corporation, Form 10-Q, 2024 Q3	R, 403, H
DTX0211	LIQ_PH-ILD_00150040	LIQ_PH-ILD_00150045	Tyvaso Frequently Asked Questions, tyvasohcp.com https://www.tyvasohcp.com/pah/inhaled-prostacyclin/faqs/	A, C, FN, FRE 106, H
DTX0212	LIQ_PH-ILD_00150046	LIQ_PH-ILD_00150050	Tyvaso Specialty Pharmacy, tyvaso.com https://www.tyvaso.com/ph-ild/support-resources/specialty-pharmacy/	A, C, FN, FRE 106, H
DTX0213	LIQ_PH-ILD_00150051	LIQ_PH-ILD_00150115	The Role of Patents and Regulatory Exclusivities in Drug Pricing, Congressional Research Service Report, 2024-01-30	A, C, FN, H, R, 403
DTX0214	LIQ_PH-ILD_00150116	LIQ_PH-ILD_00150119	What's Medicare Supplement Insurance (Medigap)?, medicare.gov https://www.medicare.gov/health-drug-plans/medigap	A, C, FN, H, R
DTX0215	LIQ_PH-ILD_00150120	LIQ_PH-ILD_00150125	VanVliet, D.S. (2017). Secondary Considerations in Pharmaceutical Patents: Part Two. <i>Pharmaceutical Law & Industry Report</i>	A, C, FN, H, IO, LC, 403
DTX0216	LIQ_PH-ILD_00150126	LIQ_PH-ILD_00150128	What You Should Know about the DME Claim Form HCFA 1500, 2022-01-03 https://medbill.net/2022/01/what-you-should-know-about-the-dme-claim-form-hcfa-1500/	A, C, FN, H, R
DTX0217	LIQ_PH-ILD_00150129	LIQ_PH-ILD_00150154	Wang, B. and Kesselheim, A. (2015). Characteristics of efficacy evidence supporting approval of supplemental indications for prescription drugs in United States, 2005-14: systematic review, <i>BMJ</i>	A, C, FN, H, R
DTX0218	LIQ_PH-ILD_00150155	LIQ_PH-ILD_00150164	Van Norman, G.A. (2023). Off-Label Use vs Off-Label Marketing of Drugs: Part 1: Off-Label Use-Patient Harms and Prescriber Responsibilities. <i>JACC Basic Transl Sci</i> . 8(2):224-233	A, C, FN, H, 403
DTX0219	LIQ_PH-ILD_00150165	LIQ_PH-ILD_00150227	UTHR Form 10-Q, 2024 Q3	R, 403, H
DTX0220	LIQ_PH-ILD_00150228	LIQ_PH-ILD_00150237	What is a Medical Science Liaison, Medical Science Liaison Society, https://themsls.org/what-is-an-msl/	A, C, FN, H
DTX0221	LIQ_PH-ILD_00150238	LIQ_PH-ILD_00150296	UTHR Form 10-Q, 2024 Q1	R, 403, H
DTX0222	LIQ_PH-ILD_00150297	LIQ_PH-ILD_00150353	UTHR Form 10-Q, 2023 Q2	R, 403, H
DTX0223	LIQ_PH-ILD_00150354	LIQ_PH-ILD_00150417	UTHR Form 10-Q, 2024 Q2	R, 403, H
DTX0224	LIQ_PH-ILD_00150418	LIQ_PH-ILD_00150473	UTHR Form 10-Q, 2023 Q1	R, 403, H
DTX0225	LIQ_PH-ILD_00150474	LIQ_PH-ILD_00150533	UTHR Form 10-Q, 2023 Q3	R, 403, H
DTX0226	LIQ_PH-ILD_00150534	LIQ_PH-ILD_00150593	UTHR Form 10-Q, 2021 Q3	R, 403, H
DTX0227	LIQ_PH-ILD_00150594	LIQ_PH-ILD_00150647	UTHR Form 10-Q, 2021 Q1	R, 403, H
DTX0228	LIQ_PH-ILD_00150648	LIQ_PH-ILD_00150712	UTHR Form 10-Q, 2020 Q1	R, 403, H
DTX0229	LIQ_PH-ILD_00150713	LIQ_PH-ILD_00150769	UTHR Form 10-Q, 2021 Q2	R, 403, H
DTX0230	LIQ_PH-ILD_00150770	LIQ_PH-ILD_00150846	UTHR Form 10-Q, 2020 Q2	R, 403, H

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DTX0231	LIQ_PH-ILD_00150847	LIQ_PH-ILD_00150904	UTHR Form 10-Q, 2020 Q3	R, 403, H
DTX0232	LIQ_PH-ILD_00150905	LIQ_PH-ILD_00150908	United Press Release, United Therapeutics Announces FDA Approval of Third Generation Nebulizer for the Tyvaso Inhalation System, 2017-10-23, https://www.prnewswire.com/newsreleases/united-therapeutics-announces-fda-approval-of-third-generation-nebulizer-for-the-tvvaso-inhalationsystem-300540953.html	A, C, FN, H
DTX0233	LIQ_PH-ILD_00150909	LIQ_PH-ILD_00150921	United Press Release, United Therapeutics Corporation Reports First Quarter 2021 Financial Results, 2021-05-05, https://www.prnewswire.com/news-releases/united-therapeutics-corporation-reports-first-quarter-2021-financialresults-301283848.html	A, C, FN, H
DTX0234	LIQ_PH-ILD_00150922	LIQ_PH-ILD_00151135	UTHR Form 10-K, FYE Dec. 31, 2017	R, 403, H
DTX0235	LIQ_PH-ILD_00151144	LIQ_PH-ILD_00151151	United Press Release, United Therapeutics Announces BREEZE Study of Investigational Tyvaso DPI Meets Primary Objective, 2021-01-28, https://www.prnewswire.com/news-releases/unitedtherapeutics-announces-breeze-study-of-investigational-tvvaso-dpi-meets-primary-objective-301216857.html	A, C, FN, H
DTX0236	LIQ_PH-ILD_00151152	LIQ_PH-ILD_00151209	UTHR Form 10-Q, 2019 Q3	R, 403, H
DTX0237	LIQ_PH-ILD_00151210	LIQ_PH-ILD_00151275	UTHR Form 10-Q, 2019 Q2	R, 403, H
DTX0238	LIQ_PH-ILD_00151276	LIQ_PH-ILD_00151334	UTHR Form 10-Q, 2019 Q1	R, 403, H
DTX0239	LIQ_PH-ILD_00151335	LIQ_PH-ILD_00151465	UTHR Form 10-K, FYE Dec. 31, 2023	R, 403, H
DTX0240	LIQ_PH-ILD_00151466	LIQ_PH-ILD_00151586	UTHR Form 10-K, FYE Dec. 31, 2022	R, 403, H
DTX0241	LIQ_PH-ILD_00151587	LIQ_PH-ILD_00151705	UTHR Form 10-K, FYE Dec. 31, 2021	R, 403, H
DTX0242	LIQ_PH-ILD_00151706	LIQ_PH-ILD_00151828	UTHR Form 10-K, FYE Dec. 31, 2020	R, 403, H
DTX0243	LIQ_PH-ILD_00151829	LIQ_PH-ILD_00151997	UTHR Form 10-K, FYE Dec. 31, 2019	R, 403, H
DTX0244	LIQ_PH-ILD_00151998	LIQ_PH-ILD_00152207	UTHR Form 10-K, FYE Dec. 31, 2018	R, 403, H
DTX0245	LIQ_PH-ILD_00152227	LIQ_PH-ILD_00152232	United Press Release, United Therapeutics Announces INCREASE Study Of Tyvaso® Meets Primary And All Secondary Endpoints, 2020-02-24, https://ir.unither.com/press-releases/2020/02-24-2020-161749814	A, C, FN, H, BE
DTX0246	LIQ_PH-ILD_00152233	LIQ_PH-ILD_00152236	DME & Supplies & Accessories Used with DME, cms.gov, https://www.cms.gov/medicare/payment/fee-schedules/dmepos-fee-schedule/dme-supplies-accessories-used-dme	A, C, FN, H
DTX0247	LIQ_PH-ILD_00152237	LIQ_PH-ILD_00152250	Tsang, Y., et al., <i>Impact of selexipag use within 12 months of pulmonary arterial hypertension diagnosis on hospitalizations and medical costs: A retrospective cohort study</i> , Clin. Respir. J., 17(12): 1209-1222 (2023)	A, C, FN, H, 403, R
DTX0248	LIQ_PH-ILD_00152251	LIQ_PH-ILD_00152251	Marques, R.B., et al., <i>Efficacy and safety of selexipag in real-life in patients with pulmonary arterial hypertension: early results of RAMPHAS study</i> , Eur. Heart J., 43(S2): 1932 (2022)	A, C, FN, H, 403, R
DTX0249	LIQ_PH-ILD_00152252	LIQ_PH-ILD_00152258	Santini F.C., et al., <i>Safety and Efficacy of Re-treating with Immunotherapy after Immune-Related Adverse Events in Patients with NSCLC</i> , Cancer Immunol. Res., 6(9): 1093-1099 (2018)	A, C, FN, H, 403, R
DTX0250	LIQ_PH-ILD_00152259	LIQ_PH-ILD_00152261	FDA News Release: FDA approves first drug for spinal muscular atrophy (Dec. 23, 2016), https://www.fda.gov/news-events/press-announcements/fda-approves-first-drug-spinal-muscular-atrophy	A, C, FN, FRE 106, H, 403, R

DTX0251	LIQ_PH-ILD_00152262	LIQ_PH-ILD_00152268	Frank, B.S., et al., <i>Safety and Effectiveness of Selexipag in Pediatric Pulmonary Hypertension: A Retrospective Multicenter Cohort Study</i> , J. Pediatrics, 275: 114221 (2024)	A, C, FN, H, 403, R
DTX0252	LIQ_PH-ILD_00152269	LIQ_PH-ILD_00152275	Kylhammar, D., et al., <i>A comprehensive risk stratification at early follow-up determines prognosis in pulmonary arterial hypertension</i> , Eur. Heart J., 39(47): 4175-4181 (2018)	A, C, FN, H
DTX0253	PARIKH_PH-ILD_00000001	PARIKH_PH-ILD_00000004	Parikh, et al., Safety and Tolerability of High-dose Inhaled Treprostinil in Pulmonary Hypertension, <i>J Cardiovasc Pharmacol</i> 67:322-325 (2016)	A, C, FN, H
DTX0254	PARIKH_PH-ILD_00000005	PARIKH_PH-ILD_00000007	December 2015 email correspondence between K. Parikh, S. Rajagopal and UTC	A, C, FN, IC, 403, BE, H
DTX0255	RAJAN_SAGGAR_PH-ILD_000001	RAJAN_SAGGAR_PH-ILD_000001	Email exchange with R. Saggar re Meeting with Martine Rothblatt, June 2010	A, C, FN, IC, 403, BE, H
DTX0256	RAJAN_SAGGAR_PH-ILD_000002	RAJAN_SAGGAR_PH-ILD_000004	Email exchange between R. Saggar and M. Rothblatt re Tre for IPF/ILD, June 2010	A, C, FN, IC, 403, BE, H
DTX0257	RAJAN_SAGGAR_PH-ILD_000005	RAJAN_SAGGAR_PH-ILD_000008	Email exchange re Meeting summary and actions - Feb 16-fibrosis protocol discussion, Feb. 2015	A, C, FN, IC, 403, BE, H
DTX0258	RAJAN_SAGGAR_PH-ILD_000009	RAJAN_SAGGAR_PH-ILD_0000101	UTC TDE-PH-204 Protocol Discussion Summary, RM20227 RTP, Feb 16, 2015	A, C, FN, IC, 403, BE, H
DTX0259	RAJAN_SAGGAR_PH-ILD_000012	RAJAN_SAGGAR_PH-ILD_000015	Email exchange between R. Saggar, R. Saggar and K. Laliberte re Draft of oral treprostinil fibrosis protocol, Sept-Oct 2014	A, C, FN, IC, 403, BE, H
DTX0260	RAJAN_SAGGAR_PH-ILD_000016	RAJAN_SAGGAR_PH-ILD_000019	Email exchange between R. Saggar and F. Sasinowski, January 2011	A, C, FN, IC, 403, BE, H
DTX0261	RAJAN_SAGGAR_PH-ILD_000020	RAJAN_SAGGAR_PH-ILD_000020	Email exchange between R. Saggar and K. Laliberte re Fibrosis Protocol, March 9, 2015	A, C, FN, IC, 403, BE, H
DTX0262	RAJAN_SAGGAR_PH-ILD_000021	RAJAN_SAGGAR_PH-ILD_000023	May 2014 Email exchange re Meeting at ATS for Oral Treprostinil Fibrosis Study	A, C, FN, IC, 403, BE, H, FN, A, AF, BE, IE, MIS, R
DTX0263	RAJAN_SAGGAR_PH-ILD_000024	RAJAN_SAGGAR_PH-ILD_000024	Email from R. Staszewski re TDE-PH-204 Temporary Suspension of Clinical Trial	A, C, FN, IC, 403, BE, H
DTX0264	UTC_LIQ00063322	UTC_LIQ00063333	Interstitial Lung Disease and PH-ILD Backgrounder	A, C, FN, H
DTX0265	UTC_LIQ00063612	UTC_LIQ00063616	United Therapeutics, <i>United Therapeutics Announces INCREASE Study of Tyvaso® Meets Primary and All Secondary Endpoints</i> , https://ir.unither.com/press-releases/2020/02-24-2020-161749814 (Feb. 24, 2020) ("Feb. 2020 Press Release")	A, C, FN, H
DTX0266	UTC_LIQ00063621	UTC_LIQ00063631	Interstititl Lung Disease (ILD) Exploratory Qualitative Research	A, C, FN, IC, 403, BE, H
DTX0267	UTC_LIQ00063640	UTC_LIQ00063652	ThinkGen Research on PH Associated with Interstitial Lung Disease (PH-ILD)	A, C, FN, IC, 403, BE, H
DTX0268	UTC_LIQ00077885	UTC_LIQ00077886	Email exchange with G. Bottorff, March 2020	A, C, FN, IC, 403, BE, H
DTX0269	UTC_LIQ00077892	UTC_LIQ00077892	Sales Force Working Model	A, C, FN, IC, 403, BE, H, R
DTX0270	UTC_LIQ00077893	UTC_LIQ00077893	Sales force size.xlsx	A, C, FN, IC, 403, BE, H, R
DTX0271	UTC_LIQ00077947	UTC_LIQ00077948	UTC Co-Pay Support brochure	A, C, FN, IC, 403, BE, H, R
DTX0272	UTC_LIQ00077977	UTC_LIQ00077985	UTC Digital Strategy, March 2020	A, C, FN, IC, 403, BE, H
DTX0273	UTC_LIQ00077996	UTC_LIQ00078005	Statement of Work - Interstitial Lung Disease (ILD) Exploratory Qualitative Research	A, C, FN, IC, 403, BE, H
DTX0274	UTC_LIQ00078069	UTC_LIQ00078073	Email from Gregory Bottorff April 9, 2020 RE: ILD-PH sales force size and structure survey	A, C, FN, IC, 403, BE, H
DTX0275	UTC_LIQ00078118	UTC_LIQ00078118	G. Bottorff email RE: Thoughts on first 5 ILD qual interviews	A, C, FN, IC, 403, BE, H

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DTX0276	UTC_LIQ00078531	UTC_LIQ00078537	Statement of Work INCREASE Value Proposition Research for Use of Tyvaso in PH-ILD between UTC and Healogix, 21 May 2020	A, C, FN, IC, 403, BE, H, R
DTX0277	UTC_LIQ00092585	UTC_LIQ00092587	Email exchange re RE: brainstorm ILD target list?	A, C, FN, IC, 403, BE, H
DTX0278	UTC_LIQ00092632	UTC_LIQ00092635	Email exchange RE: ILD-PH sales force size and structure survey	A, C, FN, IC, 403, BE, H
DTX0279	UTC_LIQ00092824	UTC_LIQ00092825	Email exchange re FW: Survey next steps.msg	A, C, FN, IC, 403, BE, H
DTX0280	UTC_LIQ00104554	UTC_LIQ00104554	P. Smith email re Dr. Waxman's Orphan Drug Designation Letter to the FDA (November 15, 2017)	A, C, FN, IC, 403, BE, H
DTX0281	UTC_LIQ00104555	UTC_LIQ00104557	A. Waxman's letter re Orphan Drug Designation to the FDA (November 15, 2017)	A, C, FN, IC, 403, BE, H, IO
DTX0282	UTC_LIQ00111120	UTC_LIQ00111133	2017 UTC Slideshow: Advice on Support and Best Practices for Tyvaso	A, C, FN, IC, 403, BE, H
DTX0283	UTC_LIQ00111589	UTC_LIQ00111593	2017 UTC Brochure: Referral and Support Resource Guide	A, C, FN, IC, 403, BE, H
DTX0284	UTC_LIQ00150099	UTC_LIQ00150101	Email exchange re ATS 2018 Abstract Notification, attaching INCREASE poster for ATS18	A, C, FN, IC, 403, BE, H
DTX0285	UTC_LIQ00159920	UTC_LIQ00159921	January 27, 2015 Email from Dean Bunce forwarding A. Lim email re Tyvaso WHO Group 3 Summary	A, C, FN, IC, 403, BE, H
DTX0286	UTC_LIQ00161082	UTC_LIQ00161082	Sept. 18, 2015 UTC Email	A, C, FN, IC, 403, BE, H
DTX0287	UTC_LIQ00161733	UTC_LIQ00161735	A. Waxman email to Dr. Gil Golden (Oct. 21, 2014)	A, C, FN, IC, 403, BE, H
DTX0288	UTC_LIQ00177872	UTC_LIQ00177877	Email from C. Hobbs to D. Bunce attaching Draft Waxman letter to ODD and ODD response letter	A, C, FN, IC, 403, BE, H
DTX0289	UTC_LIQ00199614	UTC_LIQ00199619	Email exchange RE: NEED HELP - Re: ILD-PH sales force size and structure survey.msg	A, C, FN, IC, 403, BE, H
DTX0290	UTC_LIQ00199658	UTC_LIQ00199663	Email exchange RE: Framework for tomorrow's discussion.msg	A, C, FN, IC, 403, BE, H
DTX0291	UTC_LIQ00202686	UTC_LIQ00202716	Email from B. Palmer to D. Bunce attaching Clinical Development Leadership Slides 03 Oct 17	A, C, FN, IC, 403, BE, H
DTX0292	UTC_LIQ00209441	UTC_LIQ00209441	Feb. 18, 2016 Email from N. Leedom re RIN-PH-201/202: Kick-Off Meeting Slides	A, C, FN, IC, 403, BE, H
DTX0293	UTC_LIQ00209442	UTC_LIQ00209472	RIN-PH-201, RIN-PH-202 Protocol Presentation, Kick-Off Meeting (17-18 Feb 2016)	A, C, FN, IC, 403, BE, H
DTX0294	UTC_LIQ00209474	UTC_LIQ00209489	Obstructive and Restrictive Lung Pathology, Kiernan DeAngelis, MD	A, C, FN, IC, 403, BE, H, IO
DTX0295	UTC_LIQ00209490	UTC_LIQ00209522	RIN-PH-201 Medical Review of Inclusion and Exclusion Criteria based on Amendment 1 dated 20 Nov 2015	A, C, FN, IC, 403, BE, H
DTX0296	UTC_LIQ00251722	UTC_LIQ00251737	Ladenburg Thalman - United Therapeutics - Company Update Oct. 19, 2021	A, FN, H, R, IO
DTX0297	UTC_LIQ00254745	UTC_LIQ00254786	Harvard Medical School Curriculum Vitae - Aaron B. Waxman	R, H, B, 403, A, FN, IE
DTX0298	UTC_OREN_00115451	UTC_OREN_00115463	2011 Tyvaso® Label	A, C, FN, FRE 106, H
DTX0299	UTC_OREN_00588617	UTC_OREN_00588629	2013 Orenitram Label	A, C, FN, FRE 106, H
DTX0300	UTC_OREN_00834909	UTC_OREN_00834910	Email from D. Balukas re MARC Committee Mtg	A, C, FN, IC, 403, BE, H, FN, A, AF, BE, IE, MIS, R
DTX0301	UTC_OREN_00834982	UTC_OREN_00834986	UTC Concept Sheet, Investigator Sponsored Study titled A Retrospective Observational Study of Outcomes of Patients with Group 1 and 2 PH Treated with High Dose Tyvaso, Jan. 29, 2015	A, C, FN, IC, 403, BE, H, FN, A, AF, BE, IE, MIS, R
DTX0302	UTC_OREN_00835026	UTC_OREN_00835032	UTC Medical Affairs Research Committee (MARC) Meeting Agenda, April 10, 2015	A, C, FN, IC, 403, BE, H, FN, A, AF, BE, IE, MIS, R
DTX0303	UTC_OREN_00835034	UTC_OREN_00835038	January 20, 2015 Email from M. Howell re MARC Meeting Materials	A, C, FN, IC, 403, BE, H, FN, A, AF, BE, IE, MIS, R

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DTX0304	UTC_OREN_00835039	UTC_OREN_00835044	Attachment to Email from M. Howell re MARC Meeting Materials: UTC Global Medical Affairs Research Committee (GMARC) Meeting minutes, Jan. 9, 2015	A, C, FN, IC, 403, BE, H, FN, A, AF, BE, IE, MIS, R
DTX0305	UTC_PH-ILD_000395	UTC_PH-ILD_000404	ASCENT at Clinical Trials.gov	IC, NI, FN, R, 403, A, H, BE
DTX0306	UTC_PH-ILD_002329	UTC_PH-ILD_002348	Liquidia - J.P. Morgan Healthcare Conference (20240110).pdf	A, C, FN, H
DTX0307	UTC_PH-ILD_002744	UTC_PH-ILD_003051	Liquidia Corporation's Form 10-K for Fiscal Year 2022	R, 403, H
DTX0308	UTC_PH-ILD_005035	UTC_PH-ILD_005043	Refinitiv Eikon (20230504) - Q1 2023 Liquidia Corp Earnings Call.pdf	A, C, FN, H
DTX0309	UTC_PH-ILD_005188	UTC_PH-ILD_005194	TD Cowen (20231220) - TYVASO 793 PATENT PTAB DECISION AFFIRMED.pdf	A, FN, H, R, IO
DTX0310	UTC_PH-ILD_005244	UTC_PH-ILD_005260	2023 Tyvaso® DPI Label	A, C, FN, FRE 106, H
DTX0311	UTC_PH-ILD_005268	UTC_PH-ILD_005283	2022 Tyvaso® Label	A, C, FN, FRE 106, H
DTX0312	UTC_PH-ILD_005361		UBS - United Therapeutics Corporation - 3Q Wrap Headline risk of competitive threat overrated	A, FN, H, R, IO
DTX0313	UTC_PH-ILD_005529	UTC_PH-ILD_005688	UTC 2011 Form 10-K	R, 403, H
DTX0314	UTC_PH-ILD_005689	UTC_PH-ILD_005858	UTC 2012 Form 10-K	R, 403, H
DTX0315	UTC_PH-ILD_005859	UTC_PH-ILD_006038	UTC 2013 Form 10-K	R, 403, H
DTX0316	UTC_PH-ILD_006039	UTC_PH-ILD_006228	UTC 2014 Form 10-K	R, 403, H
DTX0317	UTC_PH-ILD_006229	UTC_PH-ILD_006385	UTC 2015 Form 10-K	R, 403, H
DTX0318	UTC_PH-ILD_006386	UTC_PH-ILD_006537	UTC 2016 Form 10-K	R, 403, H
DTX0319	UTC_PH-ILD_006538	UTC_PH-ILD_006751	UTC 2017 Form 10-K	R, 403, H
DTX0320	UTC_PH-ILD_006752	UTC_PH-ILD_006961	UTC 2018 Form 10-K	R, 403, H
DTX0321	UTC_PH-ILD_006962	UTC_PH-ILD_007130	UTC 2019 Form 10-K	R, 403, H
DTX0322	UTC_PH-ILD_007131	UTC_PH-ILD_007253	UTC 2020 Form 10-K	R, 403, H
DTX0323	UTC_PH-ILD_007254	UTC_PH-ILD_007405	UTC 2021 Form 10-K	R, 403, H
DTX0324	UTC_PH-ILD_007552	UTC_PH-ILD_007682	UTC Form 10-K (2023)	R, 403, H
DTX0325	UTC_PH-ILD_007683	UTC_PH-ILD_007739	UTC Form 10-Q (Q2-2023)	R, 403, H
DTX0326	UTC_PH-ILD_008846	UTC_PH-ILD_008854	Wedbush - MannKind Corporation - Tyvaso DPI Royalty Deal Pads Balance Sheet, Underscores Blockbuster Potential, Jan. 3, 2024	A, FN, H, R, IO
DTX0327	UTC_PH-ILD_009101	UTC_PH-ILD_009200	UTC Treprostinil Marketing 2022 Business Plan	A, C, FN, IC, 403, BE, H
DTX0328	UTC_PH-ILD_009201	UTC_PH-ILD_009232	UT Marketing 2023 Business Planning	A, C, FN, IC, 403, BE, H
DTX0329	UTC_PH-ILD_009233	UTC_PH-ILD_009373	UTC Marketing Brand Plans 2021	A, C, FN, IC, 403, BE, H
DTX0330	UTC_PH-ILD_009374	UTC_PH-ILD_009393	Liquidia J.P. Morgan Healthcare Conference, Jan. 10, 2024	A, C, FN, H
DTX0331	UTC_PH-ILD_009394	UTC_PH-ILD_009407	42nd Annual J.P. Morgan Healthcare Conference - Liquidia Corp Presentation Call, Jan. 10, 2024	A, C, FN, H
DTX0332	UTC_PH-ILD_009408	UTC_PH-ILD_009409	Tyvaso DPI and Nebulized Tyvaso Gross Margins.pdf	A, C, FN, IC, 403, BE, H
DTX0333	UTC_PH-ILD_009410	UTC_PH-ILD_009418	United Therapeutics Tyvaso Forecast (2023-2035)	A, C, FN, IC, 403, BE, H
DTX0334	UTC_PH-ILD_009419	UTC_PH-ILD_009771	File History for U.S. Patent No. 11,826,327	403, IC, BE, C, FN
DTX0335	UTC_PH-ILD_009420	UTC_PH-ILD_009498	Non-provisional Application, "Treatment for Interstitial Lung Disease"	403, IC, BE, C, FN
DTX0336	UTC_PH-ILD_009537	UTC_PH-ILD_009547	Information Disclosure Statement for U.S. Patent Application No. 17/233061, submitted May 12, 2021	403, IC, BE, C, FN
DTX0337	UTC_PH-ILD_009555	UTC_PH-ILD_009558	Information Disclosure Statement for U.S. Patent Application No. 17/233061, submitted Sept. 21, 2021	403, IC, BE, C, FN
DTX0338	UTC_PH-ILD_009616	UTC_PH-ILD_009642	Information Disclosure Statement for U.S. Patent Application No. 17/233061, submitted Feb. 16, 2022	403, IC, BE, C, FN
DTX0339	UTC_PH-ILD_009713	UTC_PH-ILD_009735	Information Disclosure Statement for U.S. Patent Application No. 17/233061, submitted May 12, 2021	403, IC, BE, C, FN
DTX0340	UTC_PH-ILD_009738	UTC_PH-ILD_009746	Amendment and Reply re Application No. 17/233061	403, IC, BE, C, FN

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DTX0341	UTC_PH-ILD_009749	UTC_PH-ILD_009754	Notice of Allowance re Application No. 17/233061	403, IC, BE, C, FN
DTX0342	UTC_PH-ILD_009770	UTC_PH-ILD_009771	Issue Notification re U.S. Patent No. 11,826,327	403, IC, BE, C, FN
DTX0343	UTC_PH-ILD_009772	UTC_PH-ILD_009796	U.S. Patent No. 10,716,793	403, IC, BE, C, FN
DTX0344	UTC_PH-ILD_009828	UTC_PH-ILD_009828	M. Agarwal and A.B. Waxman, Inhaled Treprostinil in Group-3 Pulmonary Hypertension, <i>J. Heart and Lung Transplant.</i> 34(4):S343 (2015) ("Agarwal 2015")	A, C, FN, H
DTX0345	UTC_PH-ILD_009839		E. Amen, et al., Analysis of V/Q-Matching—A Safety "Biomarker" in Pulmonary Drug Development?, <i>Biomarkers</i> 16(S1):S5-S10 (2011)	A, C, FN, H
DTX0346	UTC_PH-ILD_009846	UTC_PH-ILD_009852	A. Bajwa, et al., The safety and tolerability of inhaled treprostinil in patients with pulmonary hypertension and chronic obstructive pulmonary disease, <i>Pulmonary Circulation</i> 17(1):82 (2017)	A, C, FN, H
DTX0347	UTC_PH-ILD_009853	UTC_PH-ILD_009863	Behr J, et al., Efficacy and Safety of Sildenafil Added to Pirfenidone in Patients with Advanced Idiopathic Pulmonary Fibrosis and Risk of Pulmonary Hypertension: A Double-Blind, Randomised, Placebo-Controlled, Phase 2b Trial, <i>Lancet Respiratory Med.</i> 9 (2020)	A, C, FN, H, R
DTX0348	UTC_PH-ILD_009936	UTC_PH-ILD_009943	M. Faria-Urbina, et al., Inhaled Treprostinil in Pulmonary Hypertension Associated with Lung Disease, <i>Lung</i> 196:139–146 (2018) ("Faria-Urbina 2018")	A, C, FN, H
DTX0349	UTC_PH-ILD_010356	UTC_PH-ILD_010467	A Multicenter, Randomized, Double-Blinded, Placebo-Controlled Trial to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Parenchymal Lung Disease, RIN-PH-201 Clinical Study Report, May 5, 2020	A, C, FN, IC, 403, BE, H
DTX0350	UTC_PH-ILD_010487	UTC_PH-ILD_010496	Kolb, et al., Nintedanib plus Sildenafil in Patients with Idiopathic Pulmonary Fibrosis, <i>N Engl J Med</i> 379:1722-31 (2018)	A, C, FN, H, R
DTX0351	UTC_PH-ILD_010497	UTC_PH-ILD_010497	Krowka M, et al., A Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Safety and Efficacy of Iloprost Inhalation in Adults with Abnormal Pulmonary Arterial Pressure and Exercise Limitation Associated with Idiopathic Pulmonary Fibrosis, <i>Chest</i> 132:633A (2007)	A, C, FN, H
DTX0352	UTC_PH-ILD_010530	UTC_PH-ILD_010540	Nathan, et al., Riociguat for idiopathic interstitial pneumonia-associated pulmonary hypertension (RISE-IIP): a randomised, placebo-controlled phase 2b study, <i>Lancet Respir Med</i> 7:780-90 (2019)	A, C, FN, H
DTX0353	UTC_PH-ILD_010541		H. Nunes, et al., Pathology of Vascular Changes in Interstitial Lung Diseases, in <i>Pulmonary Hypertension and Interstitial Lung Disease</i> (Robert P. Baughman et al., eds., 2d ed. 2017)	A, C, FN, H
DTX0354	UTC_PH-ILD_010599	UTC_PH-ILD_010610	K. Parikh., et al., <i>Safety and Tolerability of High-dose Inhaled Treprostinil in Pulmonary Hypertension</i> , <i>J. Cardiovasc. Pharmacol.</i> 67(4): 322–25 (2016) ("Parikh 2016")	A, C, FN, H
DTX0355	UTC_PH-ILD_010611	UTC_PH-ILD_010626	PERFECT Study Description	A, C, FN, FRE 106, H
DTX0356	UTC_PH-ILD_010679	UTC_PH-ILD_010691	G. Simonneau, et al., <i>Haemodynamic definitions and updated clinical classification of pulmonary hypertension</i> , <i>Eur. Respir. J.</i> 53: 1801913 (2019)	A, C, FN, H
DTX0357	UTC_PH-ILD_010692	UTC_PH-ILD_010708	2009 Tyvaso® Label	A, C, FN, FRE 106, H
DTX0358	UTC_PH-ILD_010709	UTC_PH-ILD_010725	2022 Tyvaso DPI Label	A, C, FN, FRE 106, H
DTX0359	UTC_PH-ILD_010726	UTC_PH-ILD_010743	2023 Tyvaso® Label	A, C, FN, FRE 106, H

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DTX0360	UTC_PH-ILD_010744	UTC_PH-ILD_010758	2021 Tyvaso® Label	A, C, FN, FRE 106, H
DTX0361	UTC_PH-ILD_010774	UTC_PH-ILD_010781	U.S. Patent Publication No. 2013/0096200 ("Wade 200")	403, IC, BE, C, FN
DTX0362	UTC_PH-ILD_010782	UTC_PH-ILD_010789	L. Wang, et al., <i>Hemodynamic and gas exchange effects of inhaled iloprost in patients with COPD and pulmonary hypertension</i> , Int. J. COPD 12:3353 (2017)	A, C, FN, H
DTX0363	UTC_PH-ILD_010790	UTC_PH-ILD_010829	A. Waxman, et al., Inhaled Treprostinil in Pulmonary Hypertension Due to Interstitial Lung Disease, <i>N. Eng. J. Med.</i> 384(4):325 (2021), including supplement	A, C, FN, H
DTX0364	UTC_PH-ILD_010830	UTC_PH-ILD_010838	Zisman D, et al., A Controlled Trial of Sildenafil in Advanced Idiopathic Pulmonary Fibrosis, <i>New Eng. J. Med.</i> 363:620-628 (2010)	A, C, FN, H
DTX0365	UTC_PH-ILD_010839	UTC_PH-ILD_010841	UTC Form 8-K 2022	R, 403, H
DTX0366	UTC_PH-ILD_013520	UTC_PH-ILD_013534	UTC Type B Meeting Package for Tyvaso, NDA 022387, dated March 20, 2020	A, C, FN, FRE 106, H
DTX0367	UTC_PH-ILD_015035	UTC_PH-ILD_015040	Wade et al, Absolute Bioavailability and Pharmacokinetics of Treprostinil Sodium Administered by Acute Subcutaneous Infusion, <i>Journal of Clinical Pharmacology</i> 44:83-88 (2004)	A, C, FN, H
DTX0368	UTC_PH-ILD_020775	UTC_PH-ILD_020783	Lettieri et al., Prevalence and Outcomes of Pulmonary Arterial Hypertension in Advanced Idiopathic Pulmonary Fibrosis, <i>CHEST</i> (2006)	A, C, FN, H
DTX0369	UTC_PH-ILD_024398	UTC_PH-ILD_024474	UTC Investigator's Brochure, Version 4: July 18, 2022	A, C, FN, IC, 403, BE, H
DTX0370	UTC_PH-ILD_035969	UTC_PH-ILD_036030	UTC Clinical Study Protocol TIP-PH-101	A, C, FN, IC, 403, BE, H
DTX0371	UTC_PH-ILD_041448	UTC_PH-ILD_041460	FDA Questions and Response re: Tyvaso DPI Inhalation Powder	A, C, FN, FRE 106, H
DTX0372	UTC_PH-ILD_051374	UTC_PH-ILD_051377	June 1, 2020 Request for Priority Review Designation – Prior Approval Supplement/Efficacy Supplement for NDA 022387	A, C, FN, FRE 106, H
DTX0373	UTC_PH-ILD_054882	UTC_PH-ILD_054950	Multicenter, Randomized, Double-Blinded, Placebo-Controlled Trial to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Parenchymal Lung Disease, Protocol RIN-PH-201, October 21, 2015	A, C, FN, IC, 403, BE, H
DTX0374	UTC_PH-ILD_055371	UTC_PH-ILD_055482	INCREASE Clinical Study Report	A, C, FN, IC, 403, BE, H
DTX0375	UTC_PH-ILD_069472	UTC_PH-ILD_069522	U.S. Provisional Patent App. No. 63/011,810 (April 17, 2020)	403, IC, BE, C, FN
DTX0376	UTC_PH-ILD_069524	UTC_PH-ILD_069629	Application Data Sheet, U.S. Provisional Patent App. No. 63/160,611 (March 12, 2021)	403, IC, BE, C, FN
DTX0377	UTC_PH-ILD_069548	UTC_PH-ILD_069629	Electronic Acknowledgement Receipt, Provisional Patent Application No. 63/160611	403, IC, BE, C, FN
DTX0378	UTC_PH-ILD_072619	UTC_PH-ILD_072631	UTC Protocol RIN-PH-201/202, Feb. 18, 2016	A, C, FN, IC, 403, BE, H
DTX0379	UTC_PH-ILD_073731	UTC_PH-ILD_073733	Email from A. Lim re RIN-PH-201 Steering Committee Meeting Minutes from 9.14.15	A, C, FN, IC, 403, BE, H
DTX0380	UTC_PH-ILD_077582	UTC_PH-ILD_077620	INCREASE (RIN-PH-201) On-site Evaluation Visit	A, C, FN, IC, 403, BE, H
DTX0381	UTC_PH-ILD_081546	UTC_PH-ILD_081578	"MSL Training on Final RIN-PH-201 & 202 Protocols and Comparison to TDE-PH-204 study," dated Nov. 9, 2015	A, C, FN, IC, 403, BE, H
DTX0382	UTC_PH-ILD_081580	UTC_PH-ILD_081606	August 31, 2017 Presentation: Tyvaso in Pulmonary Hypertension due to Interstitial Lung Disease (PH-ILD): the INCREASE Study, by Peter Smith	A, C, FN, IC, 403, BE, H
DTX0383	UTC_PH-ILD_081748	UTC_PH-ILD_081748	P. Smith email to Steering Committee re recruitment (November 7, 2017)	A, C, FN, IC, 403, BE, H
DTX0384	UTC_PH-ILD_081749	UTC_PH-ILD_081761	Tyvaso in Pulmonary Hypertension Due to Interstitial Lung Disease (PH-ILD): The INCREASE Study	A, C, FN, IC, 403, BE, H
DTX0385	UTC_PH-ILD_082484	UTC_PH-ILD_082534	Presentation, "Tyvaso in WHO Group 3 – Proof of Concept," March 9, 2015	A, C, FN, IC, 403, BE, H
DTX0386	UTC_PH-ILD_082768	UTC_PH-ILD_082791	2015 UTC presentation titled WHO Group 3 Pulmonary Hypertension Tyvaso	A, C, FN, IC, 403, BE, H
DTX0387	UTC_PH-ILD_082805	UTC_PH-ILD_082951	UTC Investigator Brochure, August 26, 2016	A, C, FN, IC, 403, BE, H

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DTX0388	UTC_PH-ILD_094740	UTC_PH-ILD_094743	Email from J. Diehl to P. Smith, L. Peterson re weekly lit search	A, C, FN, IC, 403, BE, H
DTX0389	UTC_PH-ILD_094744	UTC_PH-ILD_094752	Attachment to Email from J. Diehl to P. Smith, L. Peterson re weekly lit search: Faria-Urbina, et al., Inhaled Treprostinil in Pulmonary Hypertension Associated with Lung Disease	A, C, FN, IC, 403, BE, H
DTX0390	UTC_PH-ILD_094753	UTC_PH-ILD_094754	Email from Y. Liu re RISE-IIP Journal Club	A, C, FN, IC, 403, BE, H
DTX0391	UTC_PH-ILD_094804	UTC_PH-ILD_094804	A Multicenter, Randomized, Double-Blinded, Placebo-Controlled Trial to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Parenchymal Lung Disease (INCREASE Study) poster	A, C, FN, H
DTX0392	UTC_PH-ILD_094881	UTC_PH-ILD_094890	Faria-Urbina et al., Inhaled Treprostinil in Pulmonary Hypertension Associated With Lung Disease," Lung (2018)	A, C, FN, H
DTX0393	UTC_PH-ILD_095729	UTC_PH-ILD_095738	Curriculum Vitae - Chunqin Deng	R, H, B, 403, A, FN, IE
DTX0394	UTC_PH-ILD_095740	UTC_PH-ILD_095746	Curriculum Vitae - Leigh Peterson, Ph.D.	R, H, B, 403, A, FN, IE
DTX0395	UTC_PH-ILD_095758	UTC_PH-ILD_095763	Curriculum Vitae: Peter Maher Smith, Pharm.D., R.Ph.	R, H, B, 403, A, FN, IE
DTX0396	UTC_PH-ILD_095795	UTC_PH-ILD_095796	Email from M. Broderick re Pulmonary hypertension (PH) associated with pulmonary fibrosis (PF) Bi-weekly Touch-base, Oct. 4, 2019	A, C, FN, IC, 403, BE, H
DTX0397	UTC_PH-ILD_095800	UTC_PH-ILD_095802	Statement of Work to HCP Consulting Agreement between United Therapeutics Corp. and Rajan Saggar, M.D.	A, FN, H
DTX0398	UTC_PH-ILD_095811	UTC_PH-ILD_095812	June 8, 2017 Email from Dr. Rajan Saggar to Dr. Leigh Peterson, et al.	A, C, FN, IC, 403, BE, H
DTX0399	UTC_PH-ILD_095813	UTC_PH-ILD_095837	Drs. Rajeev Saggar and Rajan Saggar Presentation to UTC: Pulmonary Vascular Disease & Pulmonary Fibrosis: Designing a Successful Clinical Trial	, 403, A, FN, B, C, H, IE, NI, R
DTX0400	UTC_PH-ILD_095838	UTC_PH-ILD_095847	Corte et al., Bosentan in Pulmonary Hypertension Associated with Fibrotic Idiopathic Interstitial Pneumonia, American Journal of Respiratory and Critical Care Medicine 190(2): 208-217 (2014)	A, C, FN, H
DTX0401	UTC_PH-ILD_105083	UTC_PH-ILD_105152	Multicenter, Randomized, Double-Blinded, Placebo-Controlled Trial to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Parenchymal Lung Disease, Protocol RIN-PH-201, February 15, 2017	A, C, FN, IC, 403, BE, H
DTX0402	UTC_PH-ILD_112128	UTC_PH-ILD_112130	Amended and Restated Statement of Work to HCP Consulting Agreement between United Therapeutics Corp. and Aaron Waxman, M.D.	A, FN, H
DTX0403	UTC_PH-ILD_112152	UTC_PH-ILD_112156	United Therapeutics, <i>United Therapeutics Announces INCREASE Study of Tyvaso® Meets Primary and All Secondary Endpoints</i> , https://ir.unither.com/press-releases/2020/02-24-2020-161749814 (Feb. 24, 2020)	A, C, FN, H
DTX0404	UTC_PH-ILD_112161	UTC_PH-ILD_112169	Supplement appendix to S. Nathan, et al., Inhaled treprostinil and forced vital capacity in patients with interstitial lung disease and associated pulmonary hypertension: a post-hoc analysis of the INCREASE study, <i>The Lancet Respir. Med.</i> (2021), published online June 29, 2021 https://doi.org/10.1016/S2213-2600(21)00165-X	A, C, FN, H, IO
DTX0405	UTC_PH-ILD_114723	UTC_PH-ILD_114735	FDA meeting request-written responses re Tyvaso DPI, IND 134582, dated Nov. 19, 2020	A, C, FN, FRE 106, H
DTX0406	UTC_PH-ILD_114943	UTC_PH-ILD_114981	W2O Proposal for United Therapeutics 21APRIL20.pdf	A, C, FN, IC, 403, BE, H
DTX0407	UTC_PH-ILD_121148	UTC_PH-ILD_121197	UTC Tyvaso INCREASE Trial Results, Jan 2021	A, C, FN, IC, 403, BE, H

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DTX0408	UTC_PH-ILD_121512	UTC_PH-ILD_121524	UTC Statistical Analysis Plan for DMC Meeting Deliverables, Protocol RIN-PH-201 and RIN-PH-202, March 31, 2017	A, C, FN, IC, 403, BE, H
DTX0409	UTC_PH-ILD_122020	UTC_PH-ILD_122022	Email re RIN-PH-201/202 DMC Meeting Minutes and Revised DMC Charter, Feb. 17, 2016	A, C, FN, IC, 403, BE, H
DTX0410	UTC_PH-ILD_140772	UTC_PH-ILD_140773	March 2019 Email exchange re Walk data report for Site 25 RIN-PH-201	A, C, FN, IC, 403, BE, H
DTX0411	UTC_PH-ILD_140774	UTC_PH-ILD_140774	Walk_Distance_(Raw).xls	A, C, FN, IC, 403, BE, H
DTX0412	UTC_PH-ILD_143372	UTC_PH-ILD_143373	Email from D. Badesch re INCREASE (RIN-PH-201) DMC Meeting	A, C, FN, IC, 403, BE, H
DTX0413	UTC_PH-ILD_143374	UTC_PH-ILD_143374	Attachment to Email from D. Badesch re INCREASE (RIN-PH-201) DMC Meeting: Letter from D. Badesch to P. Smith	A, C, FN, IC, 403, BE, H
DTX0414	UTC_PH-ILD_144553	UTC_PH-ILD_144556	Email from A. Silverstein re treprostinil anti-fibrotic effect with attachment: Tre Fibrosis Summary	A, C, FN, IC, 403, BE, H
DTX0415	UTC_PH-ILD_144557	UTC_PH-ILD_144559	A. Silverstein, Treprostinil's Diverse Pharmacologic Profile Attenuates Fibrosis and Induces Bronchodilation	A, C, FN, IC, 403, BE, H
DTX0416	UTC_PH-ILD_144560	UTC_PH-ILD_144561	May 2020 Email exchange re Tyvaso Research, Pulmonary Fibrosis Facts and Pipeline	A, C, FN, IC, 403, BE, H
DTX0417	UTC_PH-ILD_145360	UTC_PH-ILD_145594	INCREASE Protocol	A, C, FN, IC, 403, BE, H
DTX0418	UTC_PH-ILD_147114		Nathan et al., Inhaled Treprostinil and forced vital capacity in patients with interstitial lung disease and associated pulmonary hypertension: a post-hoc analysis of the INCREASE study, Lancet (2021)	A, C, FN, H, IO
DTX0419	UTC_PH-ILD_148525	UTC_PH-ILD_148527	May 26, 2020 Email re INCREASE Study Webcast #1	A, C, FN, IC, 403, BE, H
DTX0420	UTC_PH-ILD_148528	UTC_PH-ILD_148574	INCREASE presentation	A, C, FN, IC, 403, BE, H
DTX0421	UTC_PH-ILD_179868	UTC_PH-ILD_179908	UTC Statistical Analysis Plan Amendment 1, Protocol RIN-PH-202, Dec. 12, 2019	A, C, FN, IC, 403, BE, H
DTX0422	UTC_PH-ILD_200239	UTC_PH-ILD_200277	UTC Statistical Analysis Plan, Protocol RIN-PH-201, Feb. 27, 2019	A, C, FN, IC, 403, BE, H
DTX0423	UTC_PH-ILD_200278	UTC_PH-ILD_200298	UTC Statistical Analysis Plan, Protocol RIN-PH-202, May 15, 2019	A, C, FN, IC, 403, BE, H
DTX0424	UTC_PH-ILD_214593	UTC_PH-ILD_214602	UTC President & COO Report, Board of Directors Meeting, Feb. 3, 2022	A, C, FN, IC, 403, BE, H
DTX0425	UTC_PH-ILD_214604	UTC_PH-ILD_214606	4Q22 script FINAL.docx	A, C, FN, IC, 403, BE, H
DTX0426	UTC_PH-ILD_214607	UTC_PH-ILD_214618	UTC President & COO Report, Board of Directors Meeting, Oct. 6, 2022 (MB Pres Report_Oct 2022_FINAL.pptx)	A, C, FN, IC, 403, BE, H
DTX0427	UTC_PH-ILD_214628	UTC_PH-ILD_214631	2024 Payer Access Contracting PlaybookDBEdits6-20-2024.docx	A, C, FN, IC, 403, BE, H
DTX0428	UTC_PH-ILD_214632	UTC_PH-ILD_214633	April 2022 Tyvaso DPI Contracting Strategy FINAL.pdf	A, C, FN, IC, 403, BE, H
DTX0429	UTC_PH-ILD_214634	UTC_PH-ILD_214634	Spreadsheet: March 2024 Commercial and Medicare Update	A, C, FN, IC, 403, BE, H
DTX0430	UTC_PH-ILD_214635	UTC_PH-ILD_214638	Tyvaso DPI Contracting Strategy	A, C, FN, IC, 403, BE, H
DTX0431	UTC_PH-ILD_214639	UTC_PH-ILD_214642	March 23, 2023 Tyvaso DPI Contracting Strategy.docx	A, C, FN, IC, 403, BE, H
DTX0432	UTC_PH-ILD_214643	UTC_PH-ILD_214645	Tyvaso DPI Contracting Strategy PMACC August 2022 FINAL.docx	A, C, FN, IC, 403, BE, H
DTX0433	UTC_PH-ILD_214646	UTC_PH-ILD_214646	Spreadsheet: Yutrepla Competitive Model, 7.28.24	A, C, FN, IC, 403, BE, H
DTX0434	UTC_PH-ILD_214647	UTC_PH-ILD_214647	Spreadsheet: Pricing Model 9.30.24	A, C, FN, IC, 403, BE, H
DTX0435	UTC_PH-ILD_214648	UTC_PH-ILD_214648	Spreadsheet: Rebate Model, 4.25.24	A, C, FN, IC, 403, BE, H
DTX0436	UTC_PH-ILD_214649	UTC_PH-ILD_214734	Presentation titled "Zinc Update" dated Oct. 19, 2023	A, C, FN, IC, 403, BE, H
DTX0437	UTC_PH-ILD_214735	UTC_PH-ILD_214735	12.31.2023 Financials - Snapshot 1.29.2024.xlsx	A, C, FN, IC, 403, BE, H
DTX0438	UTC_PH-ILD_214736	UTC_PH-ILD_214736	Spreadsheet: 2023 Q1 COGS Flux	A, C, FN, IC, 403, BE, H
DTX0439	UTC_PH-ILD_214737	UTC_PH-ILD_214737	2. COGS Flux Analysis 23Q3 - Final.pdf	A, C, FN, IC, 403, BE, H
DTX0440	UTC_PH-ILD_214738	UTC_PH-ILD_214741	Cost of Sales for Q1 2024	A, C, FN, IC, 403, BE, H
DTX0441	UTC_PH-ILD_214742	UTC_PH-ILD_214745	2. Q2 2024 COGS Analysis.pdf	A, C, FN, IC, 403, BE, H
DTX0442	UTC_PH-ILD_214746	UTC_PH-ILD_214749	2. Q2 23 COGS Analysis.pdf	A, C, FN, IC, 403, BE, H
DTX0443	UTC_PH-ILD_214750	UTC_PH-ILD_214753	2. Q4 2023 COGS Flux Analysis - Final.pdf	A, C, FN, IC, 403, BE, H

DTX0444	UTC_PH-ILD_214754	UTC_PH-ILD_214754	3. Q1 2021 RD Flux.pdf	A, C, FN, IC, 403, BE, H
DTX0445	UTC_PH-ILD_214755	UTC_PH-ILD_214755	3. Q1 22 RD Flux Analysis - MDA Meeting.xlsx	A, C, FN, IC, 403, BE, H
DTX0446	UTC_PH-ILD_214756	UTC_PH-ILD_214756	3. Q2 2021 RD Flux Analysis CONFIDENTIAL.pdf	A, C, FN, IC, 403, BE, H
DTX0447	UTC_PH-ILD_214757	UTC_PH-ILD_214757	3. Q3 RD Flux Analysis Handout for MDA Meeting.pdf	A, C, FN, IC, 403, BE, H
DTX0448	UTC_PH-ILD_214758	UTC_PH-ILD_214758	3. Q4 2021 RD Flux Analysis - MDA Handout.pdf	A, C, FN, IC, 403, BE, H
DTX0449	UTC_PH-ILD_214759	UTC_PH-ILD_214759	3.31.2023 Financials - Snapshot 4.24.2023.xlsx	A, C, FN, IC, 403, BE, H
DTX0450	UTC_PH-ILD_214760	UTC_PH-ILD_214760	3.31.2024 Financials - Snapshot 4.18.2024.xlsx	A, C, FN, IC, 403, BE, H
DTX0451	UTC_PH-ILD_214761	UTC_PH-ILD_214761	6.30.2023 Financials - Snapshot 7.18.2023.xlsx	A, C, FN, IC, 403, BE, H
DTX0452	UTC_PH-ILD_214762	UTC_PH-ILD_214762	6.30.2024 Financials - Snapshot 7.18.2024.xlsx	A, C, FN, IC, 403, BE, H
DTX0453	UTC_PH-ILD_214763	UTC_PH-ILD_214763	9.30.2023 Financials (new GL wand version) - Snapshot 10.18.2023.xlsx	A, C, FN, IC, 403, BE, H
DTX0454	UTC_PH-ILD_214764	UTC_PH-ILD_214784	UTHR Revenue Package, Q1 2024 presentation	A, C, FN, IC, 403, BE, H
DTX0455	UTC_PH-ILD_214785	UTC_PH-ILD_214807	UTHR Revenue Package, Q2 2024 presentation	A, C, FN, IC, 403, BE, H
DTX0456	UTC_PH-ILD_214808	UTC_PH-ILD_214808	Spreadsheet: Q2 '24 Net Sales and Patient Counts	A, C, FN, IC, 403, BE, H
DTX0457	UTC_PH-ILD_214809	UTC_PH-ILD_214827	Revenue Reporting Package Q1 2023.pdf	A, C, FN, IC, 403, BE, H
DTX0458	UTC_PH-ILD_214828	UTC_PH-ILD_214847	Revenue Reporting Package Q2 2023.pdf	A, C, FN, IC, 403, BE, H
DTX0459	UTC_PH-ILD_214848	UTC_PH-ILD_214866	UTHR Revenue Package, Q3 2023 presentation	A, C, FN, IC, 403, BE, H
DTX0460	UTC_PH-ILD_214867	UTC_PH-ILD_214886	UTHR Revenue Package, Q4 2023 presentation	A, C, FN, IC, 403, BE, H
DTX0461	UTC_PH-ILD_218575	UTC_PH-ILD_218575	UTC Brand Metrics Dashboard, June 18, 2021	A, C, FN, IC, 403, BE, H
DTX0462	UTC_PH-ILD_218576	UTC_PH-ILD_218576	UTC Brand Metrics Dashboard, March 14, 2023	A, C, FN, IC, 403, BE, H
DTX0463	UTC_PH-ILD_218577	UTC_PH-ILD_218577	UTC Brand Metrics Dashboard, Feb. 11, 2022	A, C, FN, IC, 403, BE, H
DTX0464	UTC_PH-ILD_218578	UTC_PH-ILD_218578	UTC Brand Metrics Dashboard, April 18, 2023	A, C, FN, IC, 403, BE, H
DTX0465	UTC_PH-ILD_218579	UTC_PH-ILD_218579	UTC Brand Metrics Dashboard, Aug. 13, 2021	A, C, FN, IC, 403, BE, H
DTX0466	UTC_PH-ILD_218580	UTC_PH-ILD_218580	UTC Brand Metrics Dashboard, July 16, 2021	A, C, FN, IC, 403, BE, H
DTX0467	UTC_PH-ILD_218581	UTC_PH-ILD_218581	UTC Brand Metrics Dashboard, Sept. 16, 2022	A, C, FN, IC, 403, BE, H
DTX0468	UTC_PH-ILD_218583	UTC_PH-ILD_218583	UTC Brand Metrics Dashboard, Nov. 17, 2022	A, C, FN, IC, 403, BE, H
DTX0469	UTC_PH-ILD_218584	UTC_PH-ILD_218584	UTC Brand Metrics Dashboard, Nov. 11, 2021	A, C, FN, IC, 403, BE, H
DTX0470	UTC_PH-ILD_218585	UTC_PH-ILD_218585	UTC Brand Metrics Dashboard, Oct. 15, 2021	A, C, FN, IC, 403, BE, H
DTX0471	UTC_PH-ILD_218586	UTC_PH-ILD_218586	UTC Brand Metrics Dashboard, Sept. 17, 2021	A, C, FN, IC, 403, BE, H
DTX0472	UTC_PH-ILD_218587	UTC_PH-ILD_218587	UTC Brand Metrics Dashboard, Dec. 14, 2021	A, C, FN, IC, 403, BE, H
DTX0473	UTC_PH-ILD_218588	UTC_PH-ILD_218588	UTC Brand Metrics Dashboard, Jan. 20, 2022	A, C, FN, IC, 403, BE, H
DTX0474	UTC_PH-ILD_218589	UTC_PH-ILD_218589	UTC Brand Metrics Dashboard, May 13, 2021	A, C, FN, IC, 403, BE, H
DTX0475	UTC_PH-ILD_218590	UTC_PH-ILD_218590	UTC Brand Metrics Dashboard, June 23, 2023	A, C, FN, IC, 403, BE, H
DTX0476	UTC_PH-ILD_218591	UTC_PH-ILD_218591	UTC Brand Metrics Dashboard, Feb. 15, 2022	A, C, FN, IC, 403, BE, H
DTX0477	UTC_PH-ILD_218592	UTC_PH-ILD_218592	UTC Brand Metrics Dashboard, Oct. 21, 2022	A, C, FN, IC, 403, BE, H
DTX0478	UTC_PH-ILD_218593	UTC_PH-ILD_218593	UTC Brand Metrics Dashboard, Aug. 17, 2023	A, C, FN, IC, 403, BE, H
DTX0479	UTC_PH-ILD_218594	UTC_PH-ILD_218594	UTC Brand Metrics Dashboard, Aug. 12, 2022	A, C, FN, IC, 403, BE, H
DTX0480	UTC_PH-ILD_218595	UTC_PH-ILD_218595	UTC Brand Metrics Dashboard, May 16, 2023	A, C, FN, IC, 403, BE, H
DTX0481	UTC_PH-ILD_218596	UTC_PH-ILD_218596	UTC Brand Metrics Dashboard, July 18, 2022	A, C, FN, IC, 403, BE, H
DTX0482	UTC_PH-ILD_218597	UTC_PH-ILD_218597	UTC Brand Metrics Dashboard, May 12, 2022	A, C, FN, IC, 403, BE, H
DTX0483	UTC_PH-ILD_218598	UTC_PH-ILD_218598	UTC Brand Metrics Dashboard, March 14, 2022	A, C, FN, IC, 403, BE, H
DTX0484	UTC_PH-ILD_218599	UTC_PH-ILD_218599	UTC Brand Metrics Dashboard, June 16, 2022	A, C, FN, IC, 403, BE, H
DTX0485	UTC_PH-ILD_218601	UTC_PH-ILD_218601	Spreadsheet: Budget Allocation 2021	A, C, FN, IC, 403, BE, H
DTX0486	UTC_PH-ILD_218602	UTC_PH-ILD_218701	Treprostinil LCM Final Report 041212 revised.pptx	A, C, FN, IC, 403, BE, H
DTX0487	UTC_PH-ILD_218902	UTC_PH-ILD_218947	TYVASO Medicine Plan_v08JUL2019ak.docx	A, C, FN, IC, 403, BE, H
DTX0488	UTC_PH-ILD_219001	UTC_PH-ILD_219004	Confidentiality and Non-disclosure Agreement between UTC and Regents of the University of California, Nov. 3, 2015	A, C, FN, IC, 403, BE, H

DEFENDANT'S TRIAL EXHIBIT LIST

DTX0489	UTC_PH-ILD_219005	UTC_PH-ILD_219016	HCP Master Consulting Agreement between UTC and Rajan Saggars, April 1, 2021	A, FN, H
DTX0490	UTC_PH-ILD_219017	UTC_PH-ILD_219019	Statement of Work to HCP Master Consulting Agreement between UTC and Rajan Saggars, Aug. 14, 2020	A, FN, H
DTX0491	UTC_PH-ILD_219020	UTC_PH-ILD_219030	HCP Master Consulting Agreement between UTC and Rajan Saggars, April 15, 2019	A, FN, H
DTX0492	UTC_PH-ILD_219031	UTC_PH-ILD_219047	Clinical Study Agreement, Sept. 10, 2014	A, C, FN, IC, 403, BE, H
DTX0493	UTC_PH-ILD_219048	UTC_PH-ILD_219051	Confidentiality and Non-disclosure Agreement between UTC and Regents of the University of California, March 6, 2015	A, C, FN, IC, 403, BE, H
DTX0494	UTC_PH-ILD_219052	UTC_PH-ILD_219055	Confidentiality and Non-Disclosure Agreement between UTC and Regents of the University of California, April 7, 2014	A, C, FN, IC, 403, BE, H
DTX0495	UTC_PH-ILD_219056	UTC_PH-ILD_219067	HCP Master Consulting Agreement between UTC and Rajan Saggars, March 1, 2024	A, C, FN, IC, 403, BE, H
DTX0496	UTC_PH-ILD_219078	UTC_PH-ILD_219086	Consulting Agreement between UTC and Rajan Saggars, M.D., Oct. 13, 2007	A, C, FN, IC, 403, BE, H
DTX0497	UTC_PH-ILD_219087	UTC_PH-ILD_219089	Amendment to HCP Consulting Agreement between UTC and Rajan Saggars, M.D., April 3, 2012	A, C, FN, IC, 403, BE, H
DTX0498	UTC_PH-ILD_219090	UTC_PH-ILD_219093	Consulting Agreement between UTC and Rajan Saggars, M.D., April 17, 2009	A, C, FN, IC, 403, BE, H
DTX0499	UTC_PH-ILD_219094	UTC_PH-ILD_219098	Consulting Agreement between UTC and Rajan Saggars, M.D., Sept. 28, 2010	A, C, FN, IC, 403, BE, H
DTX0500	UTC_PH-ILD_219105	UTC_PH-ILD_219115	HCP Consulting Agreement between UTC and Rajan Saggars, March 10, 2017	A, C, FN, IC, 403, BE, H
DTX0501	UTC_PH-ILD_219170	UTC_PH-ILD_219283	2022 ESC/ERS Pulmonary Hypertension Guidelines	A, C, FN, H
DTX0502	UTC_PH-ILD_219285	UTC_PH-ILD_219305	NCT00768300: (ARTEMIS-IPF) Randomized, Placebo-Controlled Study to Evaluate Safety and Effectiveness of Ambrisentan in IPF (ARTEMIS-IPF) (Apr. 8, 2014), available at https://clinicaltrials.gov/study/NCT00768300?term=NCT00768300&rank=1	A, C, FN, FRE 106, H
DTX0503	UTC_PH-ILD_219320	UTC_PH-ILD_219338	NCT00391443: BUILD 3: Bosentan Use in Interstitial Lung Disease (BUILD 3) (Sep. 28, 2015), available at https://clinicaltrials.gov/study/NCT00391443?term=NCT00391443&rank=1	A, C, FN, FRE 106, H
DTX0504	UTC_PH-ILD_219339	UTC_PH-ILD_219366	Oksana A. Shlobin, et al., <i>Pulmonary hypertension associated with lung diseases</i> , 64 EUR. RESP. J. (2024) ("Channick 2024")	A, C, FN, H
DTX0505	UTC_PH-ILD_219375	UTC_PH-ILD_219378	Faria-Urbina Supplementary Material (2018)	A, C, FN, H, IC
DTX0506	UTC_PH-ILD_219452	UTC_PH-ILD_219466	Steven D. Nathan et al., <i>Pulmonary hypertension in chronic lung disease and hypoxia</i> , 53 EUR. REP. J. (2019) ("Nathan Barbera 2019")	A, C, FN, H
DTX0507	UTC_PH-ILD_219467	UTC_PH-ILD_219468	K Parikh, et al., Outcomes of Patients Across the Spectrum of Pulmonary Hypertension Groups Prescribed Inhaled Treprostinil, <i>CHEST</i> (2021) ("Parikh 2021")	A, C, FN, H
DTX0508	UTC_PH-ILD_219469	UTC_PH-ILD_219530	PCMH Congress YouTube Video Transcript	A, C, FN, H, BE
DTX0509	UTC_PH-ILD_219546	UTC_PH-ILD_219567	Laura C. Price et al., <i>Pulmonary vascular and right ventricular dysfunction in adult critical care: current and emerging options for management: a systematic literature review</i> , 14 CRITICAL CARE (2010) ("Price 2010")	A, C, FN, H
DTX0510	UTC_PH-ILD_219589	UTC_PH-ILD_219600	Saggar, R. et al., Significance of Autoimmune Disease in Severe Pulmonary Hypertension Complicating Extensive Pulmonary Fibrosis: a Prospective Cohort Study, <i>Pulmonary Circulation</i> (2021)	A, C, FN, H
DTX0511	UTC_PH-ILD_219604	UTC_PH-ILD_219631	International Patent Publication No. WO 2008/098196 A1, Aug. 14, 2008 ("Wade")	403, IC, BE, C, FN

DEFENDANT'S TRIAL EXHIBIT LIST

DTX0512	UTC_PH-ILD_219696	UTC_PH-ILD_219714	NCT02138825: Efficacy and Safety of Riociguat in Patients With Symptomatic Pulmonary Hypertension (PH) Associated With Idiopathic Interstitial Pneumonias (IIP) (RISE-IIP) (Dec. 4, 2017), available at https://clinicaltrials.gov/study/NCT02138825	A, C, FN, FRE 106, H
DTX0513	UTC_PH-ILD_219746	UTC_PH-ILD_219853	International Patent Publication No. WO 2015/138423 A1, Sept. 17, 2015 ("Malinin")	403, IC, BE, C, FN
DTX0514	UTC_PH-ILD_219854	UTC_PH-ILD_219942	International Patent Publication No. WO 2016/205202 A1, Dec. 22, 2016 ("Zhang")	403, IC, BE, C, FN
DTX0515	UTC_PH-ILD_219943	UTC_PH-ILD_219955	Emmanuel Weitzenblum et al., <i>Pulmonary Hypertension in Chronic Obstructive Pulmonary Disease and Interstitial Lung Diseases</i> , 30 SEMIN. RESPIR. CRIT. CARE MED. (2009) ("Weitzenblum 2009")	A, C, FN, H
DTX0516	UTC_PH-ILD_220101	UTC_PH-ILD_220108	Brown A.W. and Nathan S.D., The Value and Application of the 6-Minute-Walk Test in Idiopathic Pulmonary Fibrosis	A, C, FN, H
DTX0517	UTC_PH-ILD_220157	UTC_PH-ILD_220163	Carter et al., Predicting Oxygen Uptake for Men and Women with Moderate to Severe Chronic Obstructive Pulmonary Disease (2003)	A, C, FN, H
DTX0518	UTC_PH-ILD_220267	UTC_PH-ILD_220278	Faria-Urbina, et al., Inhaled Treprostinil in Pulmonary Hypertension Associated with Lung Disease, <i>Lung</i> 196:139-146 (2018) with Supplementary Material	A, C, FN, H
DTX0519	UTC_PH-ILD_220279	UTC_PH-ILD_220284	Fell C.D. et al., The Prognostic Value of Cardiopulmonary Exercise Testing in Idiopathic Pulmonary Fibrosis, 179(5) <i>Am. J. Respir. Crit. Care Med</i> 402, 403 (2009)	A, C, FN, H
DTX0520	UTC_PH-ILD_220564	UTC_PH-ILD_220573	Han, et al., Sildenafil Preserves Exercise Capacity in Patients with Idiopathic Pulmonary Fibrosis and Right-sided Ventricular Dysfunction, <i>CHEST</i> 2013; 143(6):1699-1708	A, C, FN, H
DTX0521	UTC_PH-ILD_220818	UTC_PH-ILD_220827	Talmadge et al., A Phase 3 Trial of Pirfenidone in Patients with Idiopathic Pulmonary Fibrosis, <i>NEJM</i> 370:22 (2014)	A, C, FN, H
DTX0522	UTC_PH-ILD_220929	UTC_PH-ILD_220937	Nathan S et al., Validation of Test Performance Characteristics and Minimal Clinically Important Difference of the 6-Minute Walk Test in Patients with Idiopathic Pulmonary Fibrosis, <i>109(7) Respir. Med.</i> 914 (2015).	A, C, FN, H
DTX0523	UTC_PH-ILD_220938	UTC_PH-ILD_220952	Steven D. Nathan et al., <i>Pulmonary hypertension in chronic lung disease and hypoxia</i> , 53 <i>EUR. REP. J.</i> (2019)	A, C, FN, H
DTX0524	UTC_PH-ILD_220979	UTC_PH-ILD_220985	Nishiyama O. et al., Pulmonary Hemodynamics and Six-Minute Walk Test Outcomes in Patients with Interstitial Lung Disease, <i>Can. Respir. J.</i> (2016).	A, C, FN, H
DTX0525	UTC_PH-ILD_220986	UTC_PH-ILD_220995	Noble P.W. et al., Pirfenidone in Patients with Idiopathic Pulmonary Fibrosis (CAPACITY): Two Randomised Trials, <i>377 Lancet</i> 1760 (2011).	A, C, FN, H
DTX0526	UTC_PH-ILD_220996	UTC_PH-ILD_221008	Oldham W.M. et al., Network Analysis to Risk Stratify Patients with Exercise Intolerance, <i>122(6) Circ. Res.</i> 864 (2018).	A, C, FN, H
DTX0527	UTC_PH-ILD_221039	UTC_PH-ILD_221059	Orenitram Label	A, C, FN, FRE 106, H, R
DTX0528	UTC_PH-ILD_221060	UTC_PH-ILD_221067	Pastré et al., Determinants of exercise capacity in cystic fibrosis patients with mild-to-moderate lung disease (2014)	A, C, FN, H
DTX0529	UTC_PH-ILD_221096	UTC_PH-ILD_221106	Prins et al., Chronic use of PAH-specific therapy in World Health Organization Group III Pulmonary Hypertension: a systematic review and meta-analysis, <i>Pulmonary Circulation</i> (2017)	A, C, FN, H
DTX0530	UTC_PH-ILD_221117	UTC_PH-ILD_221127	Ganesh Raghu et al., <i>Macitentan for the treatment of idiopathic pulmonary fibrosis: the randomised controlled MUSIC trial</i> , 42 <i>EUR. RESPIR. J.</i> 1622 (2013)	A, C, FN, H

DEFENDANT'S TRIAL EXHIBIT LIST

DTX0531	UTC_PH-ILD_221283	UTC_PH-ILD_221295	G. Simonneau, et al., <i>Haemodynamic definitions and updated clinical classification of pulmonary hypertension</i> , Eur. Respir. J. 53: 1801913 (2019)	A, C, FN, H
DTX0532	UTC_PH-ILD_221336	UTC_PH-ILD_221340	Swigris J.J., The 6 Minute Walk in Idiopathic Pulmonary Fibrosis: Longitudinal Changes and Minimum Important Difference, 65(2) Thorax 173 (2010).	A, C, FN, H
DTX0533	UTC_PH-ILD_221552	UTC_PH-ILD_221559	Wallaert et al., Reduction of Maximal Oxygen Uptake in Sarcoidosis: Relationship with Disease Severity (2011)	A, C, FN, H, R
DTX0534	UTC_PH-ILD_221604	UTC_PH-ILD_221610	du Bois et al., Six-Minute-Walk Test in Idiopathic Pulmonary Fibrosis, 15(1) Ann. Am. Thorac. Soc. 3 ("du Bois 2010")	A, C, FN, H
DTX0535	UTC_PH-ILD_221611	UTC_PH-ILD_221618	du Bois et al., Forced Vital Capacity in Patients with Idiopathic Pulmonary Fibrosis ("du Bois 2011")	A, C, FN, H
DTX0536	UTC_PH-ILD_221645	UTC_PH-ILD_221655	2023-05-03-UTHR.OQ-LSEG StreetEvents-UTHR.OQ - Event Brief of United Therapeutics Corp conference _-101804306.pdf	A, C, FN, H, 403
DTX0537	UTC_PH-ILD_221665	UTC_PH-ILD_221674	2023-08-02-UTHR.OQ-LSEG StreetEvents-UTHR.OQ - Event Brief of United Therapeutics Corp conference _-103230295.pdf	A, C, FN, H, 403
DTX0538	UTC_PH-ILD_221691	UTC_PH-ILD_221702	2024-11-12-UTHR.OQ-LSEG StreetEvents-UTHR.OQ - Event Brief of United Therapeutics Corp conference _-111568323.pdf	A, C, FN, H, 403
DTX0539	UTC_PH-ILD_221703	UTC_PH-ILD_221714	Refinitiv Streetevents Edited Transcript, Q4 2023 Liquidia Corp Earnings Call	A, C, FN, H, 403
DTX0540	UTC_PH-ILD_221733	UTC_PH-ILD_221762	CBO - Research and Development in the Pharmaceutical Industry.pdf	A, FN, H, R, IO, NI
DTX0541	UTC_PH-ILD_221779	UTC_PH-ILD_221822	Ching and Ishihara (2010) - The Effects of Detailing on Prescribing Decisions Under Quality Uncertainty.pdf	A, C, FN, H, R
DTX0542	UTC_PH-ILD_221848	UTC_PH-ILD_221848	FDA - Patent Use Codes and Definitions (accessed 20250117).pdf	A, C, FN, FRE 106, H
DTX0543	UTC_PH-ILD_221849	UTC_PH-ILD_221852	FDA - Small Business Assistance_ Frequently Asked Questions for New Drug Product Exclusivity (accessed 01232024).pdf	A, C, FN, FRE 106, H
DTX0544	UTC_PH-ILD_221855	UTC_PH-ILD_221874	Liquidia J.P. Morgan Healthcare Conference, Jan. 10, 2024	A, C, FN, H, R
DTX0545	UTC_PH-ILD_221875	UTC_PH-ILD_221879	Guha, Rahul, et al. (2009) - The Economics of Commercial Success in Pharmaceutical Patent Litigation	A, C, FN, H
DTX0546	UTC_PH-ILD_221880	UTC_PH-ILD_221883	HBS - How to Do a Cost Benefit Analysis.pdf	A, C, FN, H, 403, R
DTX0547	UTC_PH-ILD_221884	UTC_PH-ILD_221896	Haynes, Zachary et al (2023) - Cells - Pulmonary Hypertension in Interstitial Lung Disease Updates.pdf	A, C, FN, H
DTX0548	UTC_PH-ILD_221908	UTC_PH-ILD_222039	Insmed, Form 10-K (2020).pdf	R, 403, H
DTX0549	UTC_PH-ILD_222040	UTC_PH-ILD_222062	Jefferies - 3QEPS Preview (20241028).pdf	A, FN, H, R, IO
DTX0550	UTC_PH-ILD_222063	UTC_PH-ILD_222078	Ladenburg Thalman - United Therapeutics - Tyvaso DPI Continues to Drive Revenue Growth (20241031).pdf	A, FN, H, R, IO
DTX0551	UTC_PH-ILD_222079	UTC_PH-ILD_222079	Liquidia - Ascent Study WHSP Poster (20240620).pdf	IC, NI, FN, R, 403, A, H
DTX0552	UTC_PH-ILD_222080	UTC_PH-ILD_222082	Liquidia - Publications (accessed 20250121).pdf	A, C, FN, H
DTX0553	UTC_PH-ILD_222083	UTC_PH-ILD_222390	Liquidia Corp, Form 10-K (2022).pdf	R, 403, H
DTX0554	UTC_PH-ILD_222391	UTC_PH-ILD_222778	Liquidia Corp, Form 10-K (2023).pdf	R, 403, H
DTX0555	UTC_PH-ILD_222779	UTC_PH-ILD_222950	Liquidia Corp, Form 10-Q (Q3-2024).pdf	R, 403, H
DTX0556	UTC_PH-ILD_222955	UTC_PH-ILD_223214	Liquidia Tech, Form 10-K (2019).pdf	R, 403, H
DTX0557	UTC_PH-ILD_223215	UTC_PH-ILD_223217	Liquidia Tech, Form 15 (2020).pdf	R, 403, H
DTX0558	UTC_PH-ILD_223220	UTC_PH-ILD_223232	Mayo Clinic - Pulmonary hypertension (accessed 20250109).pdf	A, C, FN, H
DTX0559	UTC_PH-ILD_223233	UTC_PH-ILD_223246	Morgan Stanley - United Therapeutics - Tyvaso Outlook Intact (20230223).pdf	A, FN, H, R, IO, 403
DTX0560	UTC_PH-ILD_223247	UTC_PH-ILD_223250	NHLBI - Pulmonary Hypertension Diagnosis (accessed 20250109).pdf	A, C, FN, H
DTX0561	UTC_PH-ILD_223251	UTC_PH-ILD_223254	NHLBI - What Are Interstitial Lung Diseases (accessed 20250109).pdf	A, C, FN, H

DEFENDANT'S TRIAL EXHIBIT LIST

DTX0562	UTC_PH-ILD_223255	UTC_PH-ILD_223259	NORD - Pulmonary Arterial Hypertension (20250109).pdf	A, C, FN, H
DTX0563	UTC_PH-ILD_223278	UTC_PH-ILD_223284	Pulmonary Fibrosis Foundation - Pulmonary Hypertension Related to ILD (accessed 20250109).pdf	A, C, FN, H
DTX0564	UTC_PH-ILD_223285	UTC_PH-ILD_223287	Pulmonary Hypertension Association - About Pulmonary Hypertension (accessed 20250109).pdf	A, C, FN, H
DTX0565	UTC_PH-ILD_223308	UTC_PH-ILD_223320	Sood, Kappe, and Stremersch (2014) - The Commercial Contribution of Clinical Studies for Pharmaceutical Drugs.pdf	A, C, FN, H
DTX0566	UTC_PH-ILD_223337	UTC_PH-ILD_223342	Sandoz Treprostinil Injection Website - Home Page	A, C, FN, H, 403
DTX0567	UTC_PH-ILD_223343	UTC_PH-ILD_223446	Tyvaso DPI Prescribing Information (202410).pdf	A, C, FN, FRE 106, H
DTX0568	UTC_PH-ILD_223447	UTC_PH-ILD_223462	Tyvaso Prescribing Information (202205).pdf	A, C, FN, FRE 106, H
DTX0569	UTC_PH-ILD_223463	UTC_PH-ILD_223468	Tyvaso Website - BREEZE Study (accessed 20250109).pdf	A, C, FN, FRE 106, H
DTX0570	UTC_PH-ILD_223469	UTC_PH-ILD_223473	Tyvaso Website - TYVASO DPI (accessed 20250109).pdf	A, C, FN, FRE 106, H
DTX0571	UTC_PH-ILD_223474	UTC_PH-ILD_223479	UCSF - PH and ILD (accessed 20250109).pdf	A, C, FN, H
DTX0572	UTC_PH-ILD_223480	UTC_PH-ILD_223484	United Press Release - United Therapeutics Announces BREEZE Study of Investigational Tyvaso DPI meets Primary Objective (20210128).pdf	A, C, FN, H
DTX0573	UTC_PH-ILD_223514	UTC_PH-ILD_223673	United, Form 10-K (2011).pdf	R, 403, H
DTX0574	UTC_PH-ILD_223674	UTC_PH-ILD_223843	United, Form 10-K (2012).pdf	R, 403, H
DTX0575	UTC_PH-ILD_223844	UTC_PH-ILD_224023	United, Form 10-K (2013).pdf	R, 403, H
DTX0576	UTC_PH-ILD_224024	UTC_PH-ILD_224213	United, Form 10-K (2014).pdf	R, 403, H
DTX0577	UTC_PH-ILD_224214	UTC_PH-ILD_224370	United, Form 10-K (2015).pdf	R, 403, H
DTX0578	UTC_PH-ILD_224371	UTC_PH-ILD_224522	United, Form 10-K (2016).pdf	R, 403, H
DTX0579	UTC_PH-ILD_224523	UTC_PH-ILD_224736	United, Form 10-K (2017).pdf	R, 403, H
DTX0580	UTC_PH-ILD_224737	UTC_PH-ILD_224946	United, Form 10-K (2018).pdf	R, 403, H
DTX0581	UTC_PH-ILD_224947	UTC_PH-ILD_225115	United, Form 10-K (2019).pdf	R, 403, H
DTX0582	UTC_PH-ILD_225116	UTC_PH-ILD_225238	United, Form 10-K (2020).pdf	R, 403, H
DTX0583	UTC_PH-ILD_225239	UTC_PH-ILD_225390	United, Form 10-K (2021).pdf	R, 403, H
DTX0584	UTC_PH-ILD_225391	UTC_PH-ILD_225536	United, Form 10-K (2022).pdf	R, 403, H
DTX0585	UTC_PH-ILD_225537	UTC_PH-ILD_225667	United, Form 10-K (2023).pdf	R, 403, H
DTX0586	UTC_PH-ILD_225668	UTC_PH-ILD_225727	United, Form-10-Q (2018-Q1).pdf	R, 403, H
DTX0587	UTC_PH-ILD_225728	UTC_PH-ILD_225790	United, Form-10-Q (2018-Q2).pdf	R, 403, H
DTX0588	UTC_PH-ILD_225791	UTC_PH-ILD_225856	United, Form-10-Q (2018-Q3).pdf	R, 403, H
DTX0589	UTC_PH-ILD_225857	UTC_PH-ILD_225915	United, Form-10-Q (2019-Q1).pdf	R, 403, H
DTX0590	UTC_PH-ILD_225916	UTC_PH-ILD_225981	United, Form-10-Q (2019-Q2).pdf	R, 403, H
DTX0591	UTC_PH-ILD_225982	UTC_PH-ILD_226039	United, Form-10-Q (2019-Q3).pdf	R, 403, H
DTX0592	UTC_PH-ILD_226040	UTC_PH-ILD_226104	United, Form-10-Q (2020-Q1).pdf	R, 403, H
DTX0593	UTC_PH-ILD_226105	UTC_PH-ILD_226181	United, Form-10-Q (2020-Q2).pdf	R, 403, H
DTX0594	UTC_PH-ILD_226182	UTC_PH-ILD_226239	United, Form-10-Q (2020-Q3).pdf	R, 403, H
DTX0595	UTC_PH-ILD_226240	UTC_PH-ILD_226293	United, Form-10-Q (2021-Q1).pdf	R, 403, H
DTX0596	UTC_PH-ILD_226294	UTC_PH-ILD_226350	United, Form-10-Q (2021-Q2).pdf	R, 403, H
DTX0597	UTC_PH-ILD_226351	UTC_PH-ILD_226410	United, Form-10-Q (2021-Q3).pdf	R, 403, H
DTX0598	UTC_PH-ILD_226411	UTC_PH-ILD_226470	United, Form-10-Q (2022-Q1).pdf	R, 403, H
DTX0599	UTC_PH-ILD_226471	UTC_PH-ILD_226582	United, Form-10-Q (2022-Q2).pdf	R, 403, H
DTX0600	UTC_PH-ILD_226583	UTC_PH-ILD_226638	United, Form-10-Q (2022-Q3).pdf	R, 403, H
DTX0601	UTC_PH-ILD_226639	UTC_PH-ILD_226694	United, Form-10-Q (2023-Q1).pdf	R, 403, H
DTX0602	UTC_PH-ILD_226695	UTC_PH-ILD_226752	United, Form-10-Q (2024-Q3).pdf	R, 403, H

DEFENDANT'S TRIAL EXHIBIT LIST

DTX0603	UTC_PH-ILD_226753	UTC_PH-ILD_226762	Waxman et al (2021) - Inhaled Treprostinil in Pulmonary Hypertension Due to Interstitial Lung Disease.pdf	A, C, FN, H
DTX0604	UTC_PH-ILD_227135	UTC_PH-ILD_227146	Steven D. Nathan et al, <i>Inhaled treprostinil in pulmonary hypertension associated with COPD: PERFECT study results</i> , 63 EUR. RESPIR. J. (2024), https://pmc.ncbi.nlm.nih.gov/articles/PMC11154754/pdf/ERJ-00172-2024.pdf	A, C, FN, H
DTX0605	UTC_WAT_00053566	UTC_WAT_00053574	D. Walmrath et al., <i>Effects of inhaled versus intravenous vasodilators in experimental pulmonary hypertension</i> , 10 EUR. RESPIR. J. (1997) ("Walmrath 1997")	A, C, FN, H
DTX0606	UTC_WAT_00211647	UTC_WAT_00211656	Gérald Simonneau et al, <i>Clinical Classification of Pulmonary Hypertension</i> , 43 J. AM. COLLEGE OF CARDIOLOGY 5S-12S (2004)	A, C, FN, H
DTX0607	UTC_WAT_00566477	UTC_WAT_00566481	Email from D. Pressley re List of Ongoing Studies and the Requirement for SDTM-ADaM mapping	A, C, FN, IC, 403, BE, H, R, AF
DTX0608	UTC_WAT00617552	UTC_WAT00617564	2013 Tyvaso® Label	A, C, FN, FRE 106, H
DTX0609	UTC_WAT00626981	UTC_WAT00626983	January 9, 2014 Email from Allison Lim	A, C, FN, IC, 403, BE, H, R, AF
DTX0610	UTC_WAT00628950	UTC_WAT00628951	November 25, 2015 Email from Roger Jeffs	A, C, FN, IC, 403, BE, H, R, AF
DTX0611	UTC_WAT00651106	UTC_WAT00651107	UTC Press Release, July 31, 2009: FDA Approves TYVASO (Treprostinil) Inhalation Solution for the Treatment of Pulmonary Arterial Hypertension	A, C, FN, H
DTX0612	UTC-Sand-Rem00961422	UTC-Sand-Rem00961531	UTC Final Study Report titled RIV-PH-402: TRUST-1: Treprostinil for Untreated Symptomatic PAH Trial: A 12-Week Multicenter Randomized Double-Blind Placebo-Controlled Trial of the Safety and Efficacy of Intravenous Remodulin in Patients in India with Pulmonary Arterial Hypertension (PAH)	A, C, FN, IC, 403, BE, H
DTX0613			Brian Patterson LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0614			Complaint, <i>United Therapeutics Corp. v. FDA</i> , No. 1:24-cv-0484-JDB, Dkt. 1 (D.D.C. Feb. 20, 2024)	BRPL, IE, LC, 403
DTX0615			Curriculum Vitae of Douglas Kidder	R, H, B, 403, A, FN, IE
DTX0616			Curriculum Vitae of Dr. Bradley Wertheim	R, H, B, 403, A, FN, IE
DTX0617			Curriculum Vitae of Dr. Frederick Selck	R, H, B, 403, A, FN, IE
DTX0618			Curriculum Vitae of Dr. Nicholas Hill	R, H, B, 403, A, FN, IE
DTX0619			Curriculum Vitae of Dr. Richard Channick	R, H, B, 403, A, FN, IE
DTX0620			Curriculum Vitae of Dr. Ronald Thisted	R, H, B, 403, A, FN, IE
DTX0621			Curriculum Vitae of Dr. Stephan Ogenstad	R, H, B, 403, A, FN, IE
DTX0622			Curriculum Vitae of Dr. Steven Nathan	R, H, B, 403, A, FN, IE
DTX0623			Dean Bunce LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0624			Declaration of Richard Channick, M.D. in Support of Defendant's Opposition to Plaintiff's Motion for Preliminary Injunction in <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , D.I. 54, No. 23-975-RGA (D. Del. March 30, 2024)	Expert, H, IE, LC, B

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DTX0625			Declaration of Steven D. Nathan, M.D. in Support of Plaintiff's Motion for Preliminary Injunction in <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , No. 23-975-RGA (D. Del. Feb. 26, 2024)	Expert, H, IE, LC, B
DTX0626			Defendant Liquidia Technologies, Inc.'s Rule 30(b)(6) Notice of Deposition of United Therapeutics Corporation	BRPL, IE, LC, 403, B
DTX0627			Defendant's Notice of Subpoenas and Subpoenas to Rajan Saggar, July 17, 2024	BRPL, IE, LC, 403, B
DTX0628			Excerpted Trial Transcript (Vol II), <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , C.A. No. 1:20-cv-755-RGA-JLH, (D. Del. March 29, 2022)	Dep, IE, LC
DTX0629			Expert Report of Dr. Nicholas Hill, Appendix D - Chart of Public Use of Inhaled Treprostinil to treat PH-ILD Patients against U.S. Patent No. 11,826,327	Expert, H, IE, LC, B
DTX0630	UTC_PH-ILD_005419	UTC_PH-ILD_005422	2022 FDA Approval of Tyvaso DPI® Press Release	A, C, FN, H
DTX0631			Greg Bottorff LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0632			Harvard Medical School Curriculum Vitae - Bradley M. Wertheim, M.D.	R, H, B, 403, A, FN, IE
DTX0633			Highlights of Prescribing Information for Tyvaso (05/2022)	A, C, FN, FRE 106, H, IE
DTX0634			I'm Aware That I'm Rare, Rajan Saggar, M.D. (463) -- PH Aware Global Association, April 8, 2024	A, C, FN, H, IE
DTX0635			Kevin Laliberte LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0636			Kiernan DeAngelis LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0637			Kiernan DeAngelis LinkedIn profile - Experience	R, H, B, 403, A, FN, IE
DTX0638			Kishan S. Parikh profile from Duke University	R, H, B, 403, A, FN, IE
DTX0639			Liquidia's First Amended Invalidity Contentions	BRPL, IE, LC, 403
DTX0640			M. Agarwal and A.B. Waxman, Inhaled Treprostinil in Group-3 Pulmonary Hypertension, <i>J. Heart and Lung Transplant.</i> 34(4):S343 (2015)	A, C, FN, H, IE
DTX0641			Mariana Faria-Urbina, MD LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0642			Michael Wade LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0643			Noah Byrd LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0644			SEC Form 4 Statement of Changes and Beneficial Ownership for Rajeev Saggar	R, 403, H, IE
DTX0645			Orange Book: Approved Drug Products with Therapeutic Equivalence Evaluations	A, C, FN, FRE 106, H, R, IE
DTX0646			Plaintiff's Disclosure of Final Infringement Contentions, dated October 30, 2024	BRPL, IE, LC, 403
DTX0647			Plaintiff's Notice of Subpoenas and Subpoenas to Rajan Saggar, July 24, 2024	BRPL, IE, LC, 403
DTX0648			Plaintiff's Responses and Objections to Defendant Liquidia Technologies, Inc.'s Rule 30(b)(6) Notice of Deposition of United Therapeutics Corporation	BRPL, IE, LC, 403
DTX0649			Preliminary Injunction Declaration of Frederic Selck, Ph.D., dated February 26, 2024	Expert, H, IE, LC, B
DTX0650			Rajan Saggar 2017 -- openpaymentsdata.cms.gov	, 403, A, FN, B, C, H, IE, NI, R
DTX0651			Rajan Saggar 2018 -- openpaymentsdata.cms.gov	, 403, A, FN, B, C, H, IE, NI, R
DTX0652			Rajan Saggar 2019 -- openpaymentsdata.cms.gov	, 403, A, FN, B, C, H, IE, NI, R
DTX0653			Rajan Saggar 2020 -- openpaymentsdata.cms.gov	, 403, A, FN, B, C, H, IE, NI, R
DTX0654			Rajan Saggar 2021 -- openpaymentsdata.cms.gov	, 403, A, FN, B, C, H, IE, NI, R
DTX0655			Rajan Saggar 2022 -- openpaymentsdata.cms.gov	, 403, A, FN, B, C, H, IE, NI, R

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DTX0656			Rajan Saggar 2023 -- openpaymentsdata.cms.gov	, 403, A, FN, B, C, H, IE, NI, R
DTX0657			Rajan Saggar, M.D. UCLA Health profile	R, H, B, 403, A, FN, IE
DTX0658			Shaun Snader LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0659			Stephen B. Maebius attorney profile from Foley & Lardner LLP	R, H, B, 403, A, FN, IE
DTX0660			Subpoena to Kishan Parikh	BRPL, IE, LC, 403
DTX0661			Subpoena to Mariana Faria-Urbina	BRPL, IE, LC, 403
DTX0662			Subpoena to Rajan Saggar	BRPL, IE, LC, 403
DTX0663			Supplementary Appendix to Kolb, et al., Nintedanib plus Sildenafil in Patients with Idiopathic Pulmonary Fibrosis, <i>N Engl J Med</i> 379:1722-31 (2018)	A, C, FN, H, IE
DTX0664			United Press Release, United Therapeutics Announces FDA Approval and Launch of Tyvaso for the Treatment of Pulmonary Hypertension Associated with Interstitial Lung Disease, 2021-04-01, https://www.prnewswire.com/news-releases/united-therapeutics-announces-fda-approval-and-launch-of-tyvaso-for-the-treatment-of-pulmonary-hypertension-associated-with-interstitial-lung-disease-301260212.html	A, C, FN, H, IE
DTX0665			United Press Release, United Therapeutics Pursues New Claims for Trade Secret Misappropriation Against Liquidia, 2021-06-07, https://ir.unither.com/press-releases/2021/06-07-2021-151622724	A, C, FN, H, IE
DTX0666			Complaint, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , C.A. No. 1:20-cv-755-RGA-JLH, D.I. 1 (D. Del. June 4, 2020)	BRPL, IE, LC, 403
DTX0667			First Amended Complaint, <i>United Therapeutics Corp. v. Liquidia Techs., Inc.</i> , C.A. No. 1:20-cv-755-RGA-JLH, D.I. 16 (D. Del. July 22, 2020)	BRPL, IE, LC, 403
DTX0668			United Therapeutics Corporation Form 10-Q for the quarterly period ended September 30, 2024	R, 403, H, IE
DTX0669			UTC Initial Infringement Contentions	BRPL, IE, LC, 403
DTX0670			UTC Third Amended Privilege Log	BRPL, IE, LC, 403
DTX0671			UTC's Amended First Supplemental Response to Liquidia's First Set of Interrogatories	BRPL, IE, LC, 403
DTX0672			Vijay Nainani LinkedIn profile	R, H, B, 403, A, FN, IE
DTX0673			WO2014/085813 (June 5, 2014)	403, IC, BE, C, FN, IE
DTX0674			WO2017/192993 (November 9, 2017)	403, IC, BE, C, FN, IE
DTX0675	SAGGAR_PH-ILD_000001		Email exchange re meeting with M. Rothblatt, June 2010	A, C, FN, IC, 403, BE, H
DTX0676	SAGGAR_PH-ILD_000022		Email exchange with M. Rothblatt, June 2010	A, C, FN, IC, 403, BE, H
DTX0677	LIQ_PH-ILD_00015477		2021 Yutrepla Tentative Approval Letter and Label	A, C, FN, FRE 106, H
DTX0678	UTC_PH-ILD_065978		IND 70,362, Protocol RIN-PH-202 (Original Protocol, Oct. 14, 2015)	A, C, FN, IC, 403, BE, H
DTX0679			Curriculum Vitae of Shaun Snader	R, H, B, 403, A, FN, IE
DTX0680			S. Nathan, PH-ILD: Does Treatment Improve Outcomes, presented at PFF Summit Nov. 7, 2019, available at https://www.youtube.com/watch?v=9mVrjWjEaP4	A, C, FN, H, IE
DTX0681	LIQ_PH-ILD_00147815	LIQ_PH-ILD_00147815	LBBASOLE.csv	IC, IE, NI, FN, OT, R
DTX0682	LIQ_PH-ILD_00147816	LIQ_PH-ILD_00147816	LBRLC.csv	IC, IE, NI, FN, OT, R
DTX0683	LIQ_PH-ILD_00147817	LIQ_PH-ILD_00147817	LBRDW.csv	IC, IE, NI, FN, OT, R
DTX0684	LIQ_PH-ILD_00147818	LIQ_PH-ILD_00147818	LBAPTT.csv	IC, IE, NI, FN, OT, R
DTX0685	LIQ_PH-ILD_00147819	LIQ_PH-ILD_00147819	PAH.csv	IC, IE, NI, FN, OT, R

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DTX0686	LIQ_PH-ILD_00147820	LIQ_PH-ILD_00147820	LBNEUTLE.csv	IC, IE, NI, FN, OT, R
DTX0687	LIQ_PH-ILD_00147821	LIQ_PH-ILD_00147821	LB.csv	IC, IE, NI, FN, OT, R
DTX0688	LIQ_PH-ILD_00147822	LIQ_PH-ILD_00147822	PEHEAD.csv	IC, IE, NI, FN, OT, R
DTX0689	LIQ_PH-ILD_00147823	LIQ_PH-ILD_00147823	DM.csv	IC, IE, NI, FN, OT, R
DTX0690	LIQ_PH-ILD_00147824	LIQ_PH-ILD_00147824	GFR.csv	IC, IE, NI, FN, OT, R
DTX0691	LIQ_PH-ILD_00147825	LIQ_PH-ILD_00147825	PAHQ.csv	IC, IE, NI, FN, OT, R
DTX0692	LIQ_PH-ILD_00147826	LIQ_PH-ILD_00147826	SV03.csv	IC, IE, NI, FN, OT, R
DTX0693	LIQ_PH-ILD_00147827	LIQ_PH-ILD_00147827	SMW.csv	IC, IE, NI, FN, OT, R
DTX0694	LIQ_PH-ILD_00147828	LIQ_PH-ILD_00147828	PENECK.csv	IC, IE, NI, FN, OT, R
DTX0695	LIQ_PH-ILD_00147829	LIQ_PH-ILD_00147829	LBERYC.csv	IC, IE, NI, FN, OT, R
DTX0696	LIQ_PH-ILD_00147830	LIQ_PH-ILD_00147830	PIFR.csv	IC, IE, NI, FN, OT, R
DTX0697	LIQ_PH-ILD_00147831	LIQ_PH-ILD_00147831	OXY.csv	IC, IE, NI, FN, OT, R
DTX0698	LIQ_PH-ILD_00147832	LIQ_PH-ILD_00147832	LBPLT.csv	IC, IE, NI, FN, OT, R
DTX0699	LIQ_PH-ILD_00147833	LIQ_PH-ILD_00147833	LBC.csv	IC, IE, NI, FN, OT, R
DTX0700	LIQ_PH-ILD_00147834	LIQ_PH-ILD_00147834	LBMONOLE.csv	IC, IE, NI, FN, OT, R
DTX0701	LIQ_PH-ILD_00147835	LIQ_PH-ILD_00147835	LBDBILI.csv	IC, IE, NI, FN, OT, R
DTX0702	LIQ_PH-ILD_00147836	LIQ_PH-ILD_00147836	PEABD.csv	IC, IE, NI, FN, OT, R
DTX0703	LIQ_PH-ILD_00147837	LIQ_PH-ILD_00147837	SF.csv	IC, IE, NI, FN, OT, R
DTX0704	LIQ_PH-ILD_00147838	LIQ_PH-ILD_00147838	LBUT.csv	IC, IE, NI, FN, OT, R
DTX0705	LIQ_PH-ILD_00147839	LIQ_PH-ILD_00147839	LBNA.csv	IC, IE, NI, FN, OT, R
DTX0706	LIQ_PH-ILD_00147840	LIQ_PH-ILD_00147840	LBINR.csv	IC, IE, NI, FN, OT, R
DTX0707	LIQ_PH-ILD_00147841	LIQ_PH-ILD_00147841	LBPT.csv	IC, IE, NI, FN, OT, R
DTX0708	LIQ_PH-ILD_00147842	LIQ_PH-ILD_00147842	EKG.csv	IC, IE, NI, FN, OT, R
DTX0709	LIQ_PH-ILD_00147843	LIQ_PH-ILD_00147843	LBALT.csv	IC, IE, NI, FN, OT, R
DTX0710	LIQ_PH-ILD_00147844	LIQ_PH-ILD_00147844	LBGGT.csv	IC, IE, NI, FN, OT, R
DTX0711	LIQ_PH-ILD_00147845	LIQ_PH-ILD_00147845	PR02.csv	IC, IE, NI, FN, OT, R
DTX0713	LIQ_PH-ILD_00147846	LIQ_PH-ILD_00147846	LBCL.csv	IC, IE, NI, FN, OT, R
DTX0714	LIQ_PH-ILD_00147847	LIQ_PH-ILD_00147847	PF.csv	IC, IE, NI, FN, OT, R
DTX0715	LIQ_PH-ILD_00147848	LIQ_PH-ILD_00147848	PEMUS.csv	IC, IE, NI, FN, OT, R
DTX0716	LIQ_PH-ILD_00147849	LIQ_PH-ILD_00147849	MHQ2.csv	IC, IE, NI, FN, OT, R
DTX0717	LIQ_PH-ILD_00147850	LIQ_PH-ILD_00147850	PECHE.csv	IC, IE, NI, FN, OT, R
DTX0718	LIQ_PH-ILD_00147851	LIQ_PH-ILD_00147851	LBMON.csv	IC, IE, NI, FN, OT, R
DTX0719	LIQ_PH-ILD_00147852	LIQ_PH-ILD_00147852	EX.csv	IC, IE, NI, FN, OT, R
DTX0720	LIQ_PH-ILD_00147853	LIQ_PH-ILD_00147853	DAT_ASUB.csv	IC, IE, NI, FN, OT, R
DTX0721	LIQ_PH-ILD_00147854	LIQ_PH-ILD_00147854	LBPHO.csv	IC, IE, NI, FN, OT, R
DTX0722	LIQ_PH-ILD_00147855	LIQ_PH-ILD_00147855	LBLEU.csv	IC, IE, NI, FN, OT, R
DTX0723	LIQ_PH-ILD_00147856	LIQ_PH-ILD_00147856	LBBUN.csv	IC, IE, NI, FN, OT, R
DTX0724	LIQ_PH-ILD_00147857	LIQ_PH-ILD_00147857	DES_PDEF.csv	IC, IE, NI, FN, OT, R
DTX0725	LIQ_PH-ILD_00147858	LIQ_PH-ILD_00147858	PEEX.csv	IC, IE, NI, FN, OT, R
DTX0726	LIQ_PH-ILD_00147859	LIQ_PH-ILD_00147859	PR03.csv	IC, IE, NI, FN, OT, R
DTX0728	LIQ_PH-ILD_00147860	LIQ_PH-ILD_00147860	AE.csv	IC, IE, NI, FN, OT, R
DTX0729	LIQ_PH-ILD_00147861	LIQ_PH-ILD_00147861	SCS.csv	IC, IE, NI, FN, OT, R
DTX0730	LIQ_PH-ILD_00147862	LIQ_PH-ILD_00147862	LBBIL.csv	IC, IE, NI, FN, OT, R
DTX0731	LIQ_PH-ILD_00147863	LIQ_PH-ILD_00147863	LBMCHC.csv	IC, IE, NI, FN, OT, R
DTX0732	LIQ_PH-ILD_00147864	LIQ_PH-ILD_00147864	WHO.csv	IC, IE, NI, FN, OT, R
DTX0733	LIQ_PH-ILD_00147865	LIQ_PH-ILD_00147865	PR01.csv	IC, IE, NI, FN, OT, R

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DTX0735	LIQ_PH-ILD_00147866	LIQ_PH-ILD_00147866	LBCA.csv	IC, IE, NI, FN, OT, R
DTX0736	LIQ_PH-ILD_00147867	LIQ_PH-ILD_00147867	DAT_SUB.csv	IC, IE, NI, FN, OT, R
DTX0737	LIQ_PH-ILD_00147868	LIQ_PH-ILD_00147868	ecos_meta.csv	IC, IE, NI, FN, OT, R
DTX0739	LIQ_PH-ILD_00147869	LIQ_PH-ILD_00147869	DAT_MC_WHO_DRUG.csv	IC, IE, NI, FN, OT, R
DTX0740	LIQ_PH-ILD_00147870	LIQ_PH-ILD_00147870	DES_FORMATS.csv	IC, IE, NI, FN, OT, R
DTX0742	LIQ_PH-ILD_00147871	LIQ_PH-ILD_00147871	GF.csv	IC, IE, NI, FN, OT, R
DTX0743	LIQ_PH-ILD_00147872	LIQ_PH-ILD_00147872	PESK.csv	IC, IE, NI, FN, OT, R
DTX0744	LIQ_PH-ILD_00147873	LIQ_PH-ILD_00147873	CM.csv	IC, IE, NI, FN, OT, R
DTX0745	LIQ_PH-ILD_00147874	LIQ_PH-ILD_00147874	CMQ.csv	IC, IE, NI, FN, OT, R
DTX0746	LIQ_PH-ILD_00147875	LIQ_PH-ILD_00147875	EX1.csv	IC, IE, NI, FN, OT, R
DTX0747	LIQ_PH-ILD_00147876	LIQ_PH-ILD_00147876	ES.csv	IC, IE, NI, FN, OT, R
DTX0748	LIQ_PH-ILD_00147877	LIQ_PH-ILD_00147877	PH.csv	IC, IE, NI, FN, OT, R
DTX0749	LIQ_PH-ILD_00147878	LIQ_PH-ILD_00147878	CT2.csv	IC, IE, NI, FN, OT, R
DTX0750	LIQ_PH-ILD_00147879	LIQ_PH-ILD_00147879	LBYMLE.csv	IC, IE, NI, FN, OT, R
DTX0751	LIQ_PH-ILD_00147880	LIQ_PH-ILD_00147880	AEQ.csv	IC, IE, NI, FN, OT, R
DTX0752	LIQ_PH-ILD_00147881	LIQ_PH-ILD_00147881	DAT_SQU.csv	IC, IE, NI, FN, OT, R
DTX0753	LIQ_PH-ILD_00147882	LIQ_PH-ILD_00147882	CT.csv	IC, IE, NI, FN, OT, R
DTX0754	LIQ_PH-ILD_00147883	LIQ_PH-ILD_00147883	LBAST.csv	IC, IE, NI, FN, OT, R
DTX0755	LIQ_PH-ILD_00147884	LIQ_PH-ILD_00147884	LBHCG.csv	IC, IE, NI, FN, OT, R
DTX0756	LIQ_PH-ILD_00147885	LIQ_PH-ILD_00147885	VSSITR.csv	IC, IE, NI, FN, OT, R
DTX0757	LIQ_PH-ILD_00147886	LIQ_PH-ILD_00147886	LBNEU.csv	IC, IE, NI, FN, OT, R
DTX0758	LIQ_PH-ILD_00147887	LIQ_PH-ILD_00147887	LBHGB.csv	IC, IE, NI, FN, OT, R
DTX0759	LIQ_PH-ILD_00147888	LIQ_PH-ILD_00147888	DAT_STUDY.csv	IC, IE, NI, FN, OT, R
DTX0761	LIQ_PH-ILD_00147889	LIQ_PH-ILD_00147889	DYS.csv	IC, IE, NI, FN, OT, R
DTX0762	LIQ_PH-ILD_00147890	LIQ_PH-ILD_00147890	PENEU.csv	IC, IE, NI, FN, OT, R
DTX0763	LIQ_PH-ILD_00147891	LIQ_PH-ILD_00147891	LBNTB.csv	IC, IE, NI, FN, OT, R
DTX0764	LIQ_PH-ILD_00147892	LIQ_PH-ILD_00147892	LBGLU.csv	IC, IE, NI, FN, OT, R
DTX0765	LIQ_PH-ILD_00147893	LIQ_PH-ILD_00147893	LBEOSLE.csv	IC, IE, NI, FN, OT, R
DTX0766	LIQ_PH-ILD_00147894	LIQ_PH-ILD_00147894	IE2.csv	IC, IE, NI, FN, OT, R
DTX0767	LIQ_PH-ILD_00147895	LIQ_PH-ILD_00147895	DAT_PGLA.csv	IC, IE, NI, FN, OT, R
DTX0769	LIQ_PH-ILD_00147896	LIQ_PH-ILD_00147896	SV01.csv	IC, IE, NI, FN, OT, R
DTX0770	LIQ_PH-ILD_00147897	LIQ_PH-ILD_00147897	OMH.csv	IC, IE, NI, FN, OT, R
DTX0772	LIQ_PH-ILD_00147898	LIQ_PH-ILD_00147898	DAT_MC_MEDDRA.csv	IC, IE, NI, FN, OT, R
DTX0773	LIQ_PH-ILD_00147899	LIQ_PH-ILD_00147899	DAT_PAGS.csv	IC, IE, NI, FN, OT, R
DTX0774	LIQ_PH-ILD_00147900	LIQ_PH-ILD_00147900	LBYLM.csv	IC, IE, NI, FN, OT, R
DTX0775	LIQ_PH-ILD_00147901	LIQ_PH-ILD_00147901	LBALKP.csv	IC, IE, NI, FN, OT, R
DTX0776	LIQ_PH-ILD_00147902	LIQ_PH-ILD_00147902	LBCK.csv	IC, IE, NI, FN, OT, R
DTX0777	LIQ_PH-ILD_00147903	LIQ_PH-ILD_00147903	LBHCT.csv	IC, IE, NI, FN, OT, R
DTX0778	LIQ_PH-ILD_00147904	LIQ_PH-ILD_00147904	LBCO2.csv	IC, IE, NI, FN, OT, R
DTX0779	LIQ_PH-ILD_00147905	LIQ_PH-ILD_00147905	DES_DDEF.csv	IC, IE, NI, FN, OT, R
DTX0781	LIQ_PH-ILD_00147906	LIQ_PH-ILD_00147906	LBLDH.csv	IC, IE, NI, FN, OT, R
DTX0782	LIQ_PH-ILD_00147907	LIQ_PH-ILD_00147907	LBEOS.csv	IC, IE, NI, FN, OT, R
DTX0783	LIQ_PH-ILD_00147908	LIQ_PH-ILD_00147908	LBCHR.csv	IC, IE, NI, FN, OT, R
DTX0784	LIQ_PH-ILD_00147909	LIQ_PH-ILD_00147909	LBMCH.csv	IC, IE, NI, FN, OT, R
DTX0785	LIQ_PH-ILD_00147910	LIQ_PH-ILD_00147910	DES_VDEF.csv	IC, IE, NI, FN, OT, R
DTX0787	LIQ_PH-ILD_00147911	LIQ_PH-ILD_00147911	OCM.csv	IC, IE, NI, FN, OT, R

DTX079	LIQ_PH-ILD_00147912	LIQ_PH-ILD_00147912	PEEENT.csv	IC, IE, NI, FN, OT, R
DTX0790	LIQ_PH-ILD_00147913	LIQ_PH-ILD_00147913	MH.csv	IC, IE, NI, FN, OT, R
DTX0791	LIQ_PH-ILD_00147914	LIQ_PH-ILD_00147914	LBMCV.csv	IC, IE, NI, FN, OT, R
DTX0792	LIQ_PH-ILD_00147915	LIQ_PH-ILD_00147915	LBRLCP.csv	IC, IE, NI, FN, OT, R
DTX0793	LIQ_PH-ILD_00147916	LIQ_PH-ILD_00147916	LBPOT.csv	IC, IE, NI, FN, OT, R
DTX0794	LIQ_PH-ILD_00147917	LIQ_PH-ILD_00147917	RV.csv	IC, IE, NI, FN, OT, R
DTX0795	LIQ_PH-ILD_00147918	LIQ_PH-ILD_00147918	EMP.csv	IC, IE, NI, FN, OT, R
DTX0796	LIQ_PH-ILD_00147919	LIQ_PH-ILD_00147919	IE.csv	IC, IE, NI, FN, OT, R
DTX0797	LIQ_PH-ILD_00147920	LIQ_PH-ILD_00148035	Data Dictionary.pdf	IC, IE, NI, FN, OT, R
DTX0798	LIQ_PH-ILD_00148036	LIQ_PH-ILD_00148036	DAT_SQUC.csv	IC, IE, NI, FN, OT, R
DTX0799	LIQ_PH-ILD_00148037	LIQ_PH-ILD_00148037	DES_CODELIST.csv	IC, IE, NI, FN, OT, R
DTX0801	LIQ_PH-ILD_00148038	LIQ_PH-ILD_00148038	LBBAS.csv	IC, IE, NI, FN, OT, R
DTX0802	LIQ_PH-ILD_00148039	LIQ_PH-ILD_00148039	MHQ.csv	IC, IE, NI, FN, OT, R
DTX0803	LIQ_PH-ILD_00148040	LIQ_PH-ILD_00148040	PE.csv	IC, IE, NI, FN, OT, R
DTX0804	LIQ_PH-ILD_00148041	LIQ_PH-ILD_00148041	MHQ2.txt	IC, IE, NI, FN, OT, R
DTX0805	LIQ_PH-ILD_00148042	LIQ_PH-ILD_00148042	IE2.txt	IC, IE, NI, FN, OT, R
DTX0806	LIQ_PH-ILD_00148043	LIQ_PH-ILD_00148043	LBCK.txt	IC, IE, NI, FN, OT, R
DTX0807	LIQ_PH-ILD_00148044	LIQ_PH-ILD_00148044	LBBUN.txt	IC, IE, NI, FN, OT, R
DTX0808	LIQ_PH-ILD_00148045	LIQ_PH-ILD_00148045	LBNEU.txt	IC, IE, NI, FN, OT, R
DTX0809	LIQ_PH-ILD_00148046	LIQ_PH-ILD_00148046	WHO.txt	IC, IE, NI, FN, OT, R
DTX0810	LIQ_PH-ILD_00148047	LIQ_PH-ILD_00148047	MD5.txt	IC, IE, NI, FN, OT, R
DTX0811	LIQ_PH-ILD_00148048	LIQ_PH-ILD_00148048	PAH.txt	IC, IE, NI, FN, OT, R
DTX0812	LIQ_PH-ILD_00148049	LIQ_PH-ILD_00148049	eCOSDataToSAS.sas	IC, IE, NI, FN, OT, R
DTX0813	LIQ_PH-ILD_00148050	LIQ_PH-ILD_00148050	PIFR.txt	IC, IE, NI, FN, OT, R
DTX0814	LIQ_PH-ILD_00148051	LIQ_PH-ILD_00148051	PAHQ.txt	IC, IE, NI, FN, OT, R
DTX0815	LIQ_PH-ILD_00148052	LIQ_PH-ILD_00148052	LBMCH.txt	IC, IE, NI, FN, OT, R
DTX0816	LIQ_PH-ILD_00148053	LIQ_PH-ILD_00148053	LBBIL.txt	IC, IE, NI, FN, OT, R
DTX0817	LIQ_PH-ILD_00148054	LIQ_PH-ILD_00148054	LBCO2.txt	IC, IE, NI, FN, OT, R
DTX0818	LIQ_PH-ILD_00148055	LIQ_PH-ILD_00148055	AE.txt	IC, IE, NI, FN, OT, R
DTX0819	LIQ_PH-ILD_00148056	LIQ_PH-ILD_00148056	LBMON.txt	IC, IE, NI, FN, OT, R
DTX0820	LIQ_PH-ILD_00148057	LIQ_PH-ILD_00148057	LBRLC.txt	IC, IE, NI, FN, OT, R
DTX0821	LIQ_PH-ILD_00148058	LIQ_PH-ILD_00148058	LBAPTT.txt	IC, IE, NI, FN, OT, R
DTX0822	LIQ_PH-ILD_00148059	LIQ_PH-ILD_00148059	DES_PDEF.txt	IC, IE, NI, FN, OT, R
DTX0823	LIQ_PH-ILD_00148060	LIQ_PH-ILD_00148060	DM.txt	IC, IE, NI, FN, OT, R
DTX0824	LIQ_PH-ILD_00148061	LIQ_PH-ILD_00148061	LB.txt	IC, IE, NI, FN, OT, R
DTX0825	LIQ_PH-ILD_00148062	LIQ_PH-ILD_00148062	CT.txt	IC, IE, NI, FN, OT, R
DTX0826	LIQ_PH-ILD_00148063	LIQ_PH-ILD_00148063	LBGGT.txt	IC, IE, NI, FN, OT, R
DTX0827	LIQ_PH-ILD_00148064	LIQ_PH-ILD_00148064	DES_VDEF.txt	IC, IE, NI, FN, OT, R
DTX0828	LIQ_PH-ILD_00148065	LIQ_PH-ILD_00148065	LBLDH.txt	IC, IE, NI, FN, OT, R
DTX0829	LIQ_PH-ILD_00148066	LIQ_PH-ILD_00148066	LBNTB.txt	IC, IE, NI, FN, OT, R
DTX0830	LIQ_PH-ILD_00148067	LIQ_PH-ILD_00148067	LBALKP.txt	IC, IE, NI, FN, OT, R
DTX0831	LIQ_PH-ILD_00148068	LIQ_PH-ILD_00148068	LBRDW.txt	IC, IE, NI, FN, OT, R
DTX0832	LIQ_PH-ILD_00148069	LIQ_PH-ILD_00148069	PEHEAD.txt	IC, IE, NI, FN, OT, R
DTX0833	LIQ_PH-ILD_00148070	LIQ_PH-ILD_00148070	LBHCT.txt	IC, IE, NI, FN, OT, R
DTX0834	LIQ_PH-ILD_00148071	LIQ_PH-ILD_00148071	LBNEUTLE.txt	IC, IE, NI, FN, OT, R
DTX0835	LIQ_PH-ILD_00148072	LIQ_PH-ILD_00148072	PR02.txt	IC, IE, NI, FN, OT, R

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DTX0836	LIQ_PH-ILD_00148073	LIQ_PH-ILD_00148073	LBBASOLE.txt	IC, IE, NI, FN, OT, R
DTX0837	LIQ_PH-ILD_00148074	LIQ_PH-ILD_00148074	LBDBILL.txt	IC, IE, NI, FN, OT, R
DTX0838	LIQ_PH-ILD_00148075	LIQ_PH-ILD_00148075	SV03.txt	IC, IE, NI, FN, OT, R
DTX0839	LIQ_PH-ILD_00148076	LIQ_PH-ILD_00148076	CT2.txt	IC, IE, NI, FN, OT, R
DTX0840	LIQ_PH-ILD_00148077	LIQ_PH-ILD_00148077	MH.txt	IC, IE, NI, FN, OT, R
DTX0841	LIQ_PH-ILD_00148078	LIQ_PH-ILD_00148078	LBUT.txt	IC, IE, NI, FN, OT, R
DTX0842	LIQ_PH-ILD_00148079	LIQ_PH-ILD_00148079	eCOSDataToSAS.log	IC, IE, NI, FN, OT, R
DTX0843	LIQ_PH-ILD_00148080	LIQ_PH-ILD_00148080	EMP.txt	IC, IE, NI, FN, OT, R
DTX0844	LIQ_PH-ILD_00148081	LIQ_PH-ILD_00148081	PEEENT.txt	IC, IE, NI, FN, OT, R
DTX0845	LIQ_PH-ILD_00148082	LIQ_PH-ILD_00148082	VSSITR.txt	IC, IE, NI, FN, OT, R
DTX0846	LIQ_PH-ILD_00148083	LIQ_PH-ILD_00148083	SCS.txt	IC, IE, NI, FN, OT, R
DTX0847	LIQ_PH-ILD_00148084	LIQ_PH-ILD_00148084	PEMUS.txt	IC, IE, NI, FN, OT, R
DTX0848	LIQ_PH-ILD_00148085	LIQ_PH-ILD_00148085	ES.txt	IC, IE, NI, FN, OT, R
DTX0849	LIQ_PH-ILD_00148086	LIQ_PH-ILD_00148086	PECHE.txt	IC, IE, NI, FN, OT, R
DTX0850	LIQ_PH-ILD_00148087	LIQ_PH-ILD_00148087	PE.txt	IC, IE, NI, FN, OT, R
DTX0851	LIQ_PH-ILD_00148088	LIQ_PH-ILD_00148088	MHQ.txt	IC, IE, NI, FN, OT, R
DTX0852	LIQ_PH-ILD_00148089	LIQ_PH-ILD_00148089	DES_FORMATS.txt	IC, IE, NI, FN, OT, R
DTX0853	LIQ_PH-ILD_00148090	LIQ_PH-ILD_00148090	EX1.txt	IC, IE, NI, FN, OT, R
DTX0854	LIQ_PH-ILD_00148091	LIQ_PH-ILD_00148091	DAT_SQUC.txt	IC, IE, NI, FN, OT, R
DTX0855	LIQ_PH-ILD_00148092	LIQ_PH-ILD_00148092	DYS.txt	IC, IE, NI, FN, OT, R
DTX0856	LIQ_PH-ILD_00148093	LIQ_PH-ILD_00148093	CMQ.txt	IC, IE, NI, FN, OT, R
DTX0857	LIQ_PH-ILD_00148094	LIQ_PH-ILD_00148094	LBCA.txt	IC, IE, NI, FN, OT, R
DTX0858	LIQ_PH-ILD_00148095	LIQ_PH-ILD_00148095	DES_CODELIST.txt	IC, IE, NI, FN, OT, R
DTX0859	LIQ_PH-ILD_00148096	LIQ_PH-ILD_00148096	PH.txt	IC, IE, NI, FN, OT, R
DTX0860	LIQ_PH-ILD_00148097	LIQ_PH-ILD_00148097	CM.txt	IC, IE, NI, FN, OT, R
DTX0861	LIQ_PH-ILD_00148098	LIQ_PH-ILD_00148098	LBCL.txt	IC, IE, NI, FN, OT, R
DTX0862	LIQ_PH-ILD_00148099	LIQ_PH-ILD_00148099	SV01.txt	IC, IE, NI, FN, OT, R
DTX0863	LIQ_PH-ILD_00148100	LIQ_PH-ILD_00148100	LBC.txt	IC, IE, NI, FN, OT, R
DTX0864	LIQ_PH-ILD_00148101	LIQ_PH-ILD_00148101	OMH.txt	IC, IE, NI, FN, OT, R
DTX0865	LIQ_PH-ILD_00148102	LIQ_PH-ILD_00148102	PR01.txt	IC, IE, NI, FN, OT, R
DTX0866	LIQ_PH-ILD_00148103	LIQ_PH-ILD_00148103	DES_DDEF.txt	IC, IE, NI, FN, OT, R
DTX0867	LIQ_PH-ILD_00148104	LIQ_PH-ILD_00148104	projinfo.txt	IC, IE, NI, FN, OT, R
DTX0868	LIQ_PH-ILD_00148105	LIQ_PH-ILD_00148105	LBLYM.txt	IC, IE, NI, FN, OT, R
DTX0869	LIQ_PH-ILD_00148106	LIQ_PH-ILD_00148106	PEABD.txt	IC, IE, NI, FN, OT, R
DTX0870	LIQ_PH-ILD_00148107	LIQ_PH-ILD_00148107	DAT_PAGS.txt	IC, IE, NI, FN, OT, R
DTX0871	LIQ_PH-ILD_00148108	LIQ_PH-ILD_00148108	LBRLCP.txt	IC, IE, NI, FN, OT, R
DTX0872	LIQ_PH-ILD_00148109	LIQ_PH-ILD_00148109	RV.txt	IC, IE, NI, FN, OT, R
DTX0873	LIQ_PH-ILD_00148110	LIQ_PH-ILD_00148110	DAT_MC_MEDDRA.txt	IC, IE, NI, FN, OT, R
DTX0874	LIQ_PH-ILD_00148111	LIQ_PH-ILD_00148111	LBCHR.txt	IC, IE, NI, FN, OT, R
DTX0875	LIQ_PH-ILD_00148112	LIQ_PH-ILD_00148112	IE.txt	IC, IE, NI, FN, OT, R
DTX0876	LIQ_PH-ILD_00148113	LIQ_PH-ILD_00148113	LBNA.txt	IC, IE, NI, FN, OT, R
DTX0877	LIQ_PH-ILD_00148114	LIQ_PH-ILD_00148114	AEQ.txt	IC, IE, NI, FN, OT, R
DTX0878	LIQ_PH-ILD_00148115	LIQ_PH-ILD_00148115	GFR.txt	IC, IE, NI, FN, OT, R
DTX0879	LIQ_PH-ILD_00148116	LIQ_PH-ILD_00148116	LBAST.txt	IC, IE, NI, FN, OT, R
DTX0880	LIQ_PH-ILD_00148117	LIQ_PH-ILD_00148117	GF.txt	IC, IE, NI, FN, OT, R
DTX0881	LIQ_PH-ILD_00148118	LIQ_PH-ILD_00148118	LBMONOLE.txt	IC, IE, NI, FN, OT, R

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DTX0882	LIQ_PH-ILD_00148119	LIQ_PH-ILD_00148119	MD5.txt	IC, IE, NI, FN, OT, R
DTX0883	LIQ_PH-ILD_00148120	LIQ_PH-ILD_00148120	LBHGB.txt	IC, IE, NI, FN, OT, R
DTX0884	LIQ_PH-ILD_00148121	LIQ_PH-ILD_00148121	eCOSDataToSAS.lst	IC, IE, NI, FN, OT, R
DTX0885	LIQ_PH-ILD_00148122	LIQ_PH-ILD_00148122	ecos_meta.txt	IC, IE, NI, FN, OT, R
DTX0886	LIQ_PH-ILD_00148123	LIQ_PH-ILD_00148123	SF.txt	IC, IE, NI, FN, OT, R
DTX0887	LIQ_PH-ILD_00148124	LIQ_PH-ILD_00148124	LBHCG.txt	IC, IE, NI, FN, OT, R
DTX0888	LIQ_PH-ILD_00148125	LIQ_PH-ILD_00148125	PEEX.txt	IC, IE, NI, FN, OT, R
DTX0889	LIQ_PH-ILD_00148126	LIQ_PH-ILD_00148126	LBPLT.txt	IC, IE, NI, FN, OT, R
DTX0890	LIQ_PH-ILD_00148127	LIQ_PH-ILD_00148127	LBPHO.txt	IC, IE, NI, FN, OT, R
DTX0891	LIQ_PH-ILD_00148128	LIQ_PH-ILD_00148128	LBPT.txt	IC, IE, NI, FN, OT, R
DTX0892	LIQ_PH-ILD_00148129	LIQ_PH-ILD_00148129	LBMCV.txt	IC, IE, NI, FN, OT, R
DTX0893	LIQ_PH-ILD_00148130	LIQ_PH-ILD_00148130	DAT_ASUB.txt	IC, IE, NI, FN, OT, R
DTX0894	LIQ_PH-ILD_00148131	LIQ_PH-ILD_00148131	PESK.txt	IC, IE, NI, FN, OT, R
DTX0895	LIQ_PH-ILD_00148132	LIQ_PH-ILD_00148132	LBEOS.txt	IC, IE, NI, FN, OT, R
DTX0896	LIQ_PH-ILD_00148133	LIQ_PH-ILD_00148133	LBPOI.txt	IC, IE, NI, FN, OT, R
DTX0897	LIQ_PH-ILD_00148134	LIQ_PH-ILD_00148249	Data Dictionary.pdf	IC, IE, NI, FN, OT, R
DTX0898	LIQ_PH-ILD_00148250	LIQ_PH-ILD_00148250	EKG.txt	IC, IE, NI, FN, OT, R
DTX0899	LIQ_PH-ILD_00148251	LIQ_PH-ILD_00148251	DAT_MC_WHO_DRUG.txt	IC, IE, NI, FN, OT, R
DTX0900	LIQ_PH-ILD_00148252	LIQ_PH-ILD_00148252	DAT_STUDY.txt	IC, IE, NI, FN, OT, R
DTX0901	LIQ_PH-ILD_00148253	LIQ_PH-ILD_00148253	EX.txt	IC, IE, NI, FN, OT, R
DTX0902	LIQ_PH-ILD_00148254	LIQ_PH-ILD_00148254	LBALT.txt	IC, IE, NI, FN, OT, R
DTX0903	LIQ_PH-ILD_00148255	LIQ_PH-ILD_00148255	MD5.txt	IC, IE, NI, FN, OT, R
DTX0904	LIQ_PH-ILD_00148256	LIQ_PH-ILD_00148256	LBINR.txt	IC, IE, NI, FN, OT, R
DTX0905	LIQ_PH-ILD_00148257	LIQ_PH-ILD_00148257	DAT_SQU.txt	IC, IE, NI, FN, OT, R
DTX0906	LIQ_PH-ILD_00148258	LIQ_PH-ILD_00148258	DAT_SUB.txt	IC, IE, NI, FN, OT, R
DTX0907	LIQ_PH-ILD_00148259	LIQ_PH-ILD_00148259	LBLEU.txt	IC, IE, NI, FN, OT, R
DTX0908	LIQ_PH-ILD_00148260	LIQ_PH-ILD_00148260	DAT_PGLA.txt	IC, IE, NI, FN, OT, R
DTX0909	LIQ_PH-ILD_00148261	LIQ_PH-ILD_00148261	LBERYC.txt	IC, IE, NI, FN, OT, R
DTX0910	LIQ_PH-ILD_00148262	LIQ_PH-ILD_00148262	PENECK.txt	IC, IE, NI, FN, OT, R
DTX0911	LIQ_PH-ILD_00148263	LIQ_PH-ILD_00148263	LBMCHC.txt	IC, IE, NI, FN, OT, R
DTX0912	LIQ_PH-ILD_00148264	LIQ_PH-ILD_00148264	MD5.txt	IC, IE, NI, FN, OT, R
DTX0913	LIQ_PH-ILD_00148265	LIQ_PH-ILD_00148265	LBLYMLE.txt	IC, IE, NI, FN, OT, R
DTX0914	LIQ_PH-ILD_00148266	LIQ_PH-ILD_00148266	LBGLU.txt	IC, IE, NI, FN, OT, R
DTX0915	LIQ_PH-ILD_00148267	LIQ_PH-ILD_00148267	PF.txt	IC, IE, NI, FN, OT, R
DTX0916	LIQ_PH-ILD_00148268	LIQ_PH-ILD_00148268	PENEU.txt	IC, IE, NI, FN, OT, R
DTX0917	LIQ_PH-ILD_00148269	LIQ_PH-ILD_00148269	SMW.txt	IC, IE, NI, FN, OT, R
DTX0918	LIQ_PH-ILD_00148270	LIQ_PH-ILD_00148270	LBBAS.txt	IC, IE, NI, FN, OT, R
DTX0919	LIQ_PH-ILD_00148271	LIQ_PH-ILD_00148271	OCM.txt	IC, IE, NI, FN, OT, R
DTX0920	LIQ_PH-ILD_00148272	LIQ_PH-ILD_00148272	LBEOSLE.txt	IC, IE, NI, FN, OT, R
DTX0921	LIQ_PH-ILD_00148273	LIQ_PH-ILD_00148273	PR03.txt	IC, IE, NI, FN, OT, R
DTX0922	LIQ_PH-ILD_00148274	LIQ_PH-ILD_00148274	OXY.txt	IC, IE, NI, FN, OT, R
DTX0923	LIQ_PH-ILD_00148275	LIQ_PH-ILD_00148275	CT2.csv	IC, IE, NI, FN, OT, R
DTX0924	LIQ_PH-ILD_00148276	LIQ_PH-ILD_00148276	DAT_ASUB.csv	IC, IE, NI, FN, OT, R
DTX0925	LIQ_PH-ILD_00148277	LIQ_PH-ILD_00148277	AEQ.csv	IC, IE, NI, FN, OT, R
DTX0926	LIQ_PH-ILD_00148278	LIQ_PH-ILD_00148278	DAT_PAGS.csv	IC, IE, NI, FN, OT, R
DTX0927	LIQ_PH-ILD_00148279	LIQ_PH-ILD_00148279	CT.csv	IC, IE, NI, FN, OT, R

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DTX0928	LIQ_PH-ILD_00148280	LIQ_PH-ILD_00148280	CM.csv	IC, IE, NI, FN, OT, R
DTX0929	LIQ_PH-ILD_00148281	LIQ_PH-ILD_00148281	DAT_MC_WHO_DRUG.csv	IC, IE, NI, FN, OT, R
DTX0930	LIQ_PH-ILD_00148282	LIQ_PH-ILD_00148282	DAT_MC_MEDDRA.csv	IC, IE, NI, FN, OT, R
DTX0931	LIQ_PH-ILD_00148283	LIQ_PH-ILD_00148283	AE.csv	IC, IE, NI, FN, OT, R
DTX0932	LIQ_PH-ILD_00148284	LIQ_PH-ILD_00148284	CMQ.csv	IC, IE, NI, FN, OT, R
DTX0933	LIQ_PH-ILD_00148285	LIQ_PH-ILD_00148285	LBBUN.csv	IC, IE, NI, FN, OT, R
DTX0934	LIQ_PH-ILD_00148286	LIQ_PH-ILD_00148286	PENECK.csv	IC, IE, NI, FN, OT, R
DTX0935	LIQ_PH-ILD_00148287	LIQ_PH-ILD_00148287	DES_PDEF.csv	IC, IE, NI, FN, OT, R
DTX0936	LIQ_PH-ILD_00148288	LIQ_PH-ILD_00148288	MH.csv	IC, IE, NI, FN, OT, R
DTX0937	LIQ_PH-ILD_00148289	LIQ_PH-ILD_00148289	LBBAS.csv	IC, IE, NI, FN, OT, R
DTX0938	LIQ_PH-ILD_00148290	LIQ_PH-ILD_00148290	PENEU.csv	IC, IE, NI, FN, OT, R
DTX0939	LIQ_PH-ILD_00148291	LIQ_PH-ILD_00148291	OMH.csv	IC, IE, NI, FN, OT, R
DTX0941	LIQ_PH-ILD_00148292	LIQ_PH-ILD_00148292	LBRLC.csv	IC, IE, NI, FN, OT, R
DTX0942	LIQ_PH-ILD_00148293	LIQ_PH-ILD_00148408	Data Dictionary.pdf	IC, IE, NI, FN, OT, R
DTX0943	LIQ_PH-ILD_00148409	LIQ_PH-ILD_00148409	LBPT.csv	IC, IE, NI, FN, OT, R
DTX0944	LIQ_PH-ILD_00148410	LIQ_PH-ILD_00148410	LBNA.csv	IC, IE, NI, FN, OT, R
DTX0945	LIQ_PH-ILD_00148411	LIQ_PH-ILD_00148411	SF.csv	IC, IE, NI, FN, OT, R
DTX0946	LIQ_PH-ILD_00148412	LIQ_PH-ILD_00148412	OXY.csv	IC, IE, NI, FN, OT, R
DTX0947	LIQ_PH-ILD_00148413	LIQ_PH-ILD_00148413	GF.csv	IC, IE, NI, FN, OT, R
DTX0948	LIQ_PH-ILD_00148414	LIQ_PH-ILD_00148414	LBLYM.csv	IC, IE, NI, FN, OT, R
DTX0949	LIQ_PH-ILD_00148415	LIQ_PH-ILD_00148415	LBPHO.csv	IC, IE, NI, FN, OT, R
DTX0950	LIQ_PH-ILD_00148416	LIQ_PH-ILD_00148416	PEMUS.csv	IC, IE, NI, FN, OT, R
DTX0951	LIQ_PH-ILD_00148417	LIQ_PH-ILD_00148417	LBCO2.csv	IC, IE, NI, FN, OT, R
DTX0952	LIQ_PH-ILD_00148418	LIQ_PH-ILD_00148418	LBALKP.csv	IC, IE, NI, FN, OT, R
DTX0953	LIQ_PH-ILD_00148419	LIQ_PH-ILD_00148419	DES_FORMATS.csv	IC, IE, NI, FN, OT, R
DTX0955	LIQ_PH-ILD_00148420	LIQ_PH-ILD_00148420	LBCK.csv	IC, IE, NI, FN, OT, R
DTX0956	LIQ_PH-ILD_00148421	LIQ_PH-ILD_00148421	LBMONOLE.csv	IC, IE, NI, FN, OT, R
DTX0957	LIQ_PH-ILD_00148422	LIQ_PH-ILD_00148422	SMW.csv	IC, IE, NI, FN, OT, R
DTX0958	LIQ_PH-ILD_00148423	LIQ_PH-ILD_00148423	LBMCV.csv	IC, IE, NI, FN, OT, R
DTX0959	LIQ_PH-ILD_00148424	LIQ_PH-ILD_00148424	SCS.csv	IC, IE, NI, FN, OT, R
DTX0960	LIQ_PH-ILD_00148425	LIQ_PH-ILD_00148425	RV.csv	IC, IE, NI, FN, OT, R
DTX0961	LIQ_PH-ILD_00148426	LIQ_PH-ILD_00148426	PH.csv	IC, IE, NI, FN, OT, R
DTX0962	LIQ_PH-ILD_00148427	LIQ_PH-ILD_00148427	LBMCHC.csv	IC, IE, NI, FN, OT, R
DTX0963	LIQ_PH-ILD_00148428	LIQ_PH-ILD_00148428	LBPOT.csv	IC, IE, NI, FN, OT, R
DTX0964	LIQ_PH-ILD_00148429	LIQ_PH-ILD_00148429	LBMON.csv	IC, IE, NI, FN, OT, R
DTX0965	LIQ_PH-ILD_00148430	LIQ_PH-ILD_00148430	OCM.csv	IC, IE, NI, FN, OT, R
DTX0967	LIQ_PH-ILD_00148431	LIQ_PH-ILD_00148431	LBEOS.csv	IC, IE, NI, FN, OT, R
DTX0968	LIQ_PH-ILD_00148432	LIQ_PH-ILD_00148432	SV03.csv	IC, IE, NI, FN, OT, R
DTX0969	LIQ_PH-ILD_00148433	LIQ_PH-ILD_00148433	DM.csv	IC, IE, NI, FN, OT, R
DTX0970	LIQ_PH-ILD_00148434	LIQ_PH-ILD_00148434	DES_CODELIST.csv	IC, IE, NI, FN, OT, R
DTX0972	LIQ_PH-ILD_00148435	LIQ_PH-ILD_00148435	DAT_SQU.csv	IC, IE, NI, FN, OT, R
DTX0973	LIQ_PH-ILD_00148436	LIQ_PH-ILD_00148436	VSSITR.csv	IC, IE, NI, FN, OT, R
DTX0974	LIQ_PH-ILD_00148437	LIQ_PH-ILD_00148437	LBHCG.csv	IC, IE, NI, FN, OT, R
DTX0975	LIQ_PH-ILD_00148438	LIQ_PH-ILD_00148438	ecos_meta.csv	IC, IE, NI, FN, OT, R
DTX0977	LIQ_PH-ILD_00148439	LIQ_PH-ILD_00148439	WHO.csv	IC, IE, NI, FN, OT, R
DTX0978	LIQ_PH-ILD_00148440	LIQ_PH-ILD_00148440	PR03.csv	IC, IE, NI, FN, OT, R

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DTX0980	LIQ_PH-ILD_00148441	LIQ_PH-ILD_00148441	LBCHR.csv	IC, IE, NI, FN, OT, R
DTX0981	LIQ_PH-ILD_00148442	LIQ_PH-ILD_00148442	DAT_SQUC.csv	IC, IE, NI, FN, OT, R
DTX0982	LIQ_PH-ILD_00148443	LIQ_PH-ILD_00148443	GFR.csv	IC, IE, NI, FN, OT, R
DTX0983	LIQ_PH-ILD_00148444	LIQ_PH-ILD_00148444	PEEX.csv	IC, IE, NI, FN, OT, R
DTX0984	LIQ_PH-ILD_00148445	LIQ_PH-ILD_00148445	PECHE.csv	IC, IE, NI, FN, OT, R
DTX0985	LIQ_PH-ILD_00148446	LIQ_PH-ILD_00148446	DAT_STUDY.csv	IC, IE, NI, FN, OT, R
DTX0987	LIQ_PH-ILD_00148447	LIQ_PH-ILD_00148447	LBCL.csv	IC, IE, NI, FN, OT, R
DTX0988	LIQ_PH-ILD_00148448	LIQ_PH-ILD_00148448	LBNEUTLE.csv	IC, IE, NI, FN, OT, R
DTX0989	LIQ_PH-ILD_00148449	LIQ_PH-ILD_00148449	LBNEU.csv	IC, IE, NI, FN, OT, R
DTX0990	LIQ_PH-ILD_00148450	LIQ_PH-ILD_00148450	PAHQ.csv	IC, IE, NI, FN, OT, R
DTX0991	LIQ_PH-ILD_00148451	LIQ_PH-ILD_00148451	IE2.csv	IC, IE, NI, FN, OT, R
DTX0992	LIQ_PH-ILD_00148452	LIQ_PH-ILD_00148452	LBAPTT.csv	IC, IE, NI, FN, OT, R
DTX0993	LIQ_PH-ILD_00148453	LIQ_PH-ILD_00148453	LBNTB.csv	IC, IE, NI, FN, OT, R
DTX0994	LIQ_PH-ILD_00148454	LIQ_PH-ILD_00148454	EMP.csv	IC, IE, NI, FN, OT, R
DTX0995	LIQ_PH-ILD_00148455	LIQ_PH-ILD_00148455	LBEOSLE.csv	IC, IE, NI, FN, OT, R
DTX0996	LIQ_PH-ILD_00148456	LIQ_PH-ILD_00148456	DAT_PGLA.csv	IC, IE, NI, FN, OT, R
DTX0998	LIQ_PH-ILD_00148457	LIQ_PH-ILD_00148457	SV01.csv	IC, IE, NI, FN, OT, R
DTX0999	LIQ_PH-ILD_00148458	LIQ_PH-ILD_00148458	LBC.csv	IC, IE, NI, FN, OT, R
DTX1000	LIQ_PH-ILD_00148459	LIQ_PH-ILD_00148459	PEABD.csv	IC, IE, NI, FN, OT, R
DTX1001	LIQ_PH-ILD_00148460	LIQ_PH-ILD_00148460	LBUT.csv	IC, IE, NI, FN, OT, R
DTX1002	LIQ_PH-ILD_00148461	LIQ_PH-ILD_00148461	LBHGB.csv	IC, IE, NI, FN, OT, R
DTX1003	LIQ_PH-ILD_00148462	LIQ_PH-ILD_00148462	DES_DDEF.csv	IC, IE, NI, FN, OT, R
DTX1005	LIQ_PH-ILD_00148463	LIQ_PH-ILD_00148463	LBLEU.csv	IC, IE, NI, FN, OT, R
DTX1006	LIQ_PH-ILD_00148464	LIQ_PH-ILD_00148464	PEHEAD.csv	IC, IE, NI, FN, OT, R
DTX1007	LIQ_PH-ILD_00148465	LIQ_PH-ILD_00148465	PIFR.csv	IC, IE, NI, FN, OT, R
DTX1008	LIQ_PH-ILD_00148466	LIQ_PH-ILD_00148466	LBDBILI.csv	IC, IE, NI, FN, OT, R
DTX1009	LIQ_PH-ILD_00148467	LIQ_PH-ILD_00148467	PRO2.csv	IC, IE, NI, FN, OT, R
DTX1011	LIQ_PH-ILD_00148468	LIQ_PH-ILD_00148468	LBRRLCP.csv	IC, IE, NI, FN, OT, R
DTX1012	LIQ_PH-ILD_00148469	LIQ_PH-ILD_00148469	EX.csv	IC, IE, NI, FN, OT, R
DTX1013	LIQ_PH-ILD_00148470	LIQ_PH-ILD_00148470	ES.csv	IC, IE, NI, FN, OT, R
DTX1014	LIQ_PH-ILD_00148471	LIQ_PH-ILD_00148471	LBLDH.csv	IC, IE, NI, FN, OT, R
DTX1015	LIQ_PH-ILD_00148472	LIQ_PH-ILD_00148472	EX1.csv	IC, IE, NI, FN, OT, R
DTX1016	LIQ_PH-ILD_00148473	LIQ_PH-ILD_00148473	MHQ.csv	IC, IE, NI, FN, OT, R
DTX1017	LIQ_PH-ILD_00148474	LIQ_PH-ILD_00148474	DYS.csv	IC, IE, NI, FN, OT, R
DTX1018	LIQ_PH-ILD_00148475	LIQ_PH-ILD_00148475	IE.csv	IC, IE, NI, FN, OT, R
DTX1019	LIQ_PH-ILD_00148476	LIQ_PH-ILD_00148476	PAH.csv	IC, IE, NI, FN, OT, R
DTX1020	LIQ_PH-ILD_00148477	LIQ_PH-ILD_00148477	PR01.csv	IC, IE, NI, FN, OT, R
DTX1022	LIQ_PH-ILD_00148478	LIQ_PH-ILD_00148478	LBBASOLE.csv	IC, IE, NI, FN, OT, R
DTX1023	LIQ_PH-ILD_00148479	LIQ_PH-ILD_00148479	LBALT.csv	IC, IE, NI, FN, OT, R
DTX1024	LIQ_PH-ILD_00148480	LIQ_PH-ILD_00148480	PESK.csv	IC, IE, NI, FN, OT, R
DTX1025	LIQ_PH-ILD_00148481	LIQ_PH-ILD_00148481	LBERYC.csv	IC, IE, NI, FN, OT, R
DTX1026	LIQ_PH-ILD_00148482	LIQ_PH-ILD_00148482	PEEENT.csv	IC, IE, NI, FN, OT, R
DTX1027	LIQ_PH-ILD_00148483	LIQ_PH-ILD_00148483	LBPLT.csv	IC, IE, NI, FN, OT, R
DTX1028	LIQ_PH-ILD_00148484	LIQ_PH-ILD_00148484	LBLYMLE.csv	IC, IE, NI, FN, OT, R
DTX1029	LIQ_PH-ILD_00148485	LIQ_PH-ILD_00148485	LBRDW.csv	IC, IE, NI, FN, OT, R
DTX1030	LIQ_PH-ILD_00148486	LIQ_PH-ILD_00148486	LBGLU.csv	IC, IE, NI, FN, OT, R

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DTX1031	LIQ_PH-ILD_00148487	LIQ_PH-ILD_00148487	LBCA.csv	IC, IE, NI, FN, OT, R
DTX1032	LIQ_PH-ILD_00148488	LIQ_PH-ILD_00148488	LBMCH.csv	IC, IE, NI, FN, OT, R
DTX1033	LIQ_PH-ILD_00148489	LIQ_PH-ILD_00148489	DES_VDEF.csv	IC, IE, NI, FN, OT, R
DTX1035	LIQ_PH-ILD_00148490	LIQ_PH-ILD_00148490	PE.csv	IC, IE, NI, FN, OT, R
DTX1036	LIQ_PH-ILD_00148491	LIQ_PH-ILD_00148491	LBBIL.csv	IC, IE, NI, FN, OT, R
DTX1037	LIQ_PH-ILD_00148492	LIQ_PH-ILD_00148492	DAT_SUB.csv	IC, IE, NI, FN, OT, R
DTX1038	LIQ_PH-ILD_00148493	LIQ_PH-ILD_00148493	LBINR.csv	IC, IE, NI, FN, OT, R
DTX1039	LIQ_PH-ILD_00148494	LIQ_PH-ILD_00148494	LBHCT.csv	IC, IE, NI, FN, OT, R
DTX1040	LIQ_PH-ILD_00148495	LIQ_PH-ILD_00148495	EKG.csv	IC, IE, NI, FN, OT, R
DTX1041	LIQ_PH-ILD_00148496	LIQ_PH-ILD_00148496	LBGGT.csv	IC, IE, NI, FN, OT, R
DTX1042	LIQ_PH-ILD_00148497	LIQ_PH-ILD_00148497	LBAST.csv	IC, IE, NI, FN, OT, R
DTX1043	LIQ_PH-ILD_00148498	LIQ_PH-ILD_00148498	MHQ2.csv	IC, IE, NI, FN, OT, R
DTX1044	LIQ_PH-ILD_00148499	LIQ_PH-ILD_00148499	PF.csv	IC, IE, NI, FN, OT, R
DTX1045	LIQ_PH-ILD_00148500	LIQ_PH-ILD_00148500	LB.csv	IC, IE, NI, FN, OT, R
DTX1046	UTC_LIQ00092826	UTC_LIQ00092826	Attachment to Email exchange re FW: Survey next steps.msg: PH-ILD Physicians List 03-18-2020.xlsx	A, C, FN, IC, 403, BE, H
DTX1047	UTC_PH-ILD_073734	UTC_PH-ILD_073746	Attachment to Email from A. Lim re RIN-PH-201 Steering Committee Meeting Minutes from 9.14.15: 16.1.1 RIN-PH-201 DRAFT Protocol Synopsis 9.15.15.docx	A, C, FN, IC, 403, BE, H
DTX1048	UTC_PH-ILD_094755	UTC_PH-ILD_094760	Attachment to Email from Y. Liu re RISE-IIP Journal Club: Ogawa et al., Clinical prediction score for identifying patients with pulmonary veno-occlusive disease/pulmonary capillary hemangiomatosis (2018)	A, C, FN, IC, 403, BE, H
DTX1049	UTC_PH-ILD_094761	UTC_PH-ILD_094777	Attachment to Email from Y. Liu re RISE-IIP Journal Club: 2015 ATS IPF-guideline.pdf	A, C, FN, IC, 403, BE, H
DTX1050	UTC_PH-ILD_094778	UTC_PH-ILD_094802	Attachment to Email from Y. Liu re RISE-IIP Journal Club: 2018 ATS-diagnosis-IPF-full-length.pdf	A, C, FN, IC, 403, BE, H
DTX1051	UTC_PH-ILD_094803	UTC_PH-ILD_094803	Attachment to Email from Y. Liu re RISE-IIP Journal Club: INCREASE-2018 ATS.pptx	A, C, FN, IC, 403, BE, H
DTX1052	UTC_PH-ILD_094804	UTC_PH-ILD_094804	Attachment to Email from Y. Liu re RISE-IIP Journal Club: oleObject1	A, C, FN, IC, 403, BE, H
DTX1053	UTC_PH-ILD_094805	UTC_PH-ILD_094812	Attachment to Email from Y. Liu re RISE-IIP Journal Club: Faria-Urbina 2018. Inhaled treprostinil in PH-LD.pdf	A, C, FN, IC, 403, BE, H
DTX1054	UTC_PH-ILD_094813	UTC_PH-ILD_094820	Attachment to Email from Y. Liu re RISE-IIP Journal Club: Saggar R, 2014. Parenteral TRE on PH-IPF.pdf	A, C, FN, IC, 403, BE, H
DTX1055	UTC_PH-ILD_094821	UTC_PH-ILD_094840	Attachment to Email from Y. Liu re RISE-IIP Journal Club: Shino, 2013. PH-ILD.pdf	A, C, FN, IC, 403, BE, H
DTX1056	UTC_PH-ILD_094841	UTC_PH-ILD_094867	Attachment to Email from Y. Liu re RISE-IIP Journal Club: Lynch III 2016. IPF review. .pdf	A, C, FN, IC, 403, BE, H
DTX1057	UTC_PH-ILD_094868	UTC_PH-ILD_094876	Attachment to Email from Y. Liu re RISE-IIP Journal Club: Tseng 2018. PH -COPD and Parenchymal lung disease.pdf	A, C, FN, IC, 403, BE, H
DTX1058	LIQ_PH-ILD_00146942	LIQ_PH-ILD_00146942	Yutrepia PAH and PH-ILD Now Approved Email	A, C, FN, IC, 403, BE, H
DTX1059	LIQ_PH-ILD_00146936	LIQ_PH-ILD_00146941	Yutrepia PH-ILD Patient Website	A, C, FN, IC, 403, BE, H
DTX1060	LIQ_PH-ILD_00146961	LIQ_PH-ILD_00146962	Liquidia Access Program Leave Behind for HCPs.pdf	A, C, FN, IC, 403, BE, H
DTX1061	LIQ_PH-ILD_00147156	LIQ_PH-ILD_00147157	US-YUTR-2400023_24-YUT-FP-2318_MV04_ILD-6-page-Leave-Behind_MECH.pdf	A, C, FN, IC, 403, BE, H

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DTX1062	LIQ_PH-ILD_00147141	LIQ_PH-ILD_00147153	US-YUTR-2400014_24_YUT-FP-2310_MV07_ILD-Core-Sales-Aid_MECH.pdf	A, C, FN, IC, 403, BE, H
DTX1063	LIQ_PH-ILD_00125094	LIQ_PH-ILD_00125109	ASCENT_Liquidia_FLUIDDA_ExternalKick-Off_Slides_31AUG2023.pdf	IC, NI, FN, R, 403, A, H
DTX1064	LIQ_PH-ILD_00125110	LIQ_PH-ILD_00125191	LIQ861 Investigators Brochure Ed 8 20231001 FINAL.pdf	A, C, FN, IC, 403, BE, H
DTX1065	LIQ_PH-ILD_00125192	LIQ_PH-ILD_00125192	ASCENT Visit tracker_0767_Liquidia_02JAN2023.xlsx	IC, NI, FN, R, 403, A, H
DTX1066	LIQ_PH-ILD_00125193	LIQ_PH-ILD_00125193	ASCENT Visit tracker_0767_Liquidia.xlsx	IC, NI, FN, R, 403, A, H
DTX1067	LIQ_PH-ILD_00125194	LIQ_PH-ILD_00125194	ASCENT Visit tracker_0767_Liquidia_13FEB2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1068	LIQ_PH-ILD_00125195	LIQ_PH-ILD_00125195	ASCENT Visit tracker_0767_Liquidia_27FEB2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1069	LIQ_PH-ILD_00125196	LIQ_PH-ILD_00125196	ASCENT Visit tracker_0767_Liquidia_13MAR2024_v2.xlsx	IC, NI, FN, R, 403, A, H
DTX1070	LIQ_PH-ILD_00125197	LIQ_PH-ILD_00125197	ASCENT Visit tracker_0767_Liquidia_26MAR2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1071	LIQ_PH-ILD_00125198	LIQ_PH-ILD_00125198	LTI-401_EDC Metrics_28Mar2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1072	LIQ_PH-ILD_00125199	LIQ_PH-ILD_00125199	0000.dat	IC, IE, NI, FN, OT, R
DTX1073	LIQ_PH-ILD_00125200	LIQ_PH-ILD_00125200	0001.dat	IC, IE, NI, FN, OT, R
DTX1074	LIQ_PH-ILD_00125201	LIQ_PH-ILD_00125201	LTI-401_EDC Metrics_14Mar2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1075	LIQ_PH-ILD_00125202	LIQ_PH-ILD_00125202	0000.dat	IC, IE, NI, FN, OT, R
DTX1076	LIQ_PH-ILD_00125203	LIQ_PH-ILD_00125203	0001.dat	IC, IE, NI, FN, OT, R
DTX1077	LIQ_PH-ILD_00125204	LIQ_PH-ILD_00125204	Liquidia_EDC Metrics_29FEB2024.xlsx	A, C, FN, IC, 403, BE, H
DTX1078	LIQ_PH-ILD_00125205	LIQ_PH-ILD_00125205	0000.dat	IC, IE, NI, FN, OT, R
DTX1079	LIQ_PH-ILD_00125206	LIQ_PH-ILD_00125206	0001.dat	IC, IE, NI, FN, OT, R
DTX1080	LIQ_PH-ILD_00125207	LIQ_PH-ILD_00125207	Liquidia_EDC Metrics_15FEB2024.xlsx	A, C, FN, IC, 403, BE, H
DTX1081	LIQ_PH-ILD_00125208	LIQ_PH-ILD_00125208	0000.dat	IC, IE, NI, FN, OT, R
DTX1082	LIQ_PH-ILD_00125209	LIQ_PH-ILD_00125209	0001.dat	IC, IE, NI, FN, OT, R
DTX1083	LIQ_PH-ILD_00125210	LIQ_PH-ILD_00125210	LTI-401_EDC Metrics_11Apr2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1084	LIQ_PH-ILD_00125211	LIQ_PH-ILD_00125211	0000.dat	IC, IE, NI, FN, OT, R
DTX1085	LIQ_PH-ILD_00125212	LIQ_PH-ILD_00125212	0001.dat	IC, IE, NI, FN, OT, R
DTX1086	LIQ_PH-ILD_00125213	LIQ_PH-ILD_00125213	LTI-401_EDC Metrics_25Apr2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1087	LIQ_PH-ILD_00125214	LIQ_PH-ILD_00125214	0000.dat	IC, IE, NI, FN, OT, R
DTX1088	LIQ_PH-ILD_00125215	LIQ_PH-ILD_00125215	0001.dat	IC, IE, NI, FN, OT, R
DTX1089	LIQ_PH-ILD_00125216	LIQ_PH-ILD_00125216	LIQUI001_LTI-401_ASCENT_80086321_Coding_CM_2024-04-18.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1090	LIQ_PH-ILD_00125217	LIQ_PH-ILD_00125217	LIQUI001_LTI-401_ASCENT_80086321_Coding_MH_2024-04-18.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1091	LIQ_PH-ILD_00125218	LIQ_PH-ILD_00125218	LIQUI001_LTI-401_ASCENT_80086321_Coding_AE_2024-04-18.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1092	LIQ_PH-ILD_00125219	LIQ_PH-ILD_00125219	LIQUI001_LTI-401_ASCENT_80086321_Coding_CM_2024-03-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1093	LIQ_PH-ILD_00125220	LIQ_PH-ILD_00125220	LIQUI001_LTI-401_ASCENT_80086321_Coding_AE_2024-03-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1094	LIQ_PH-ILD_00125221	LIQ_PH-ILD_00125221	LIQUI001_LTI-401_ASCENT_80086321_Coding_MH_2024-03-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1095	LIQ_PH-ILD_00125222	LIQ_PH-ILD_00125222	LIQUI001_LTI-401_ASCENT_80086321_Coding_CM_2024-02-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1096	LIQ_PH-ILD_00125223	LIQ_PH-ILD_00125223	LIQUI001_LTI-401_ASCENT_80086321_Coding_MH_2024-02-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1097	LIQ_PH-ILD_00125224	LIQ_PH-ILD_00125224	LIQUI001_LTI-401_ASCENT_80086321_Coding_AE_2024-02-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1098	LIQ_PH-ILD_00125225	LIQ_PH-ILD_00125225	LTI-401_AE Report_01May2024.csv	IC, NI, FN, R, 403, A, H
DTX1099	LIQ_PH-ILD_00125226	LIQ_PH-ILD_00125226	LTI-401_AE Report_01Apr2024.csv	IC, NI, FN, R, 403, A, H
DTX1100	LIQ_PH-ILD_00125227	LIQ_PH-ILD_00125227	LTI-401_EDC Metrics_09May2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1101	LIQ_PH-ILD_00125228	LIQ_PH-ILD_00125228	0000.dat	IC, IE, NI, FN, OT, R
DTX1102	LIQ_PH-ILD_00125229	LIQ_PH-ILD_00125229	0001.dat	IC, IE, NI, FN, OT, R
DTX1103	LIQ_PH-ILD_00125230	LIQ_PH-ILD_00125230	LTI-401_EDC Metrics_23May2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1104	LIQ_PH-ILD_00125231	LIQ_PH-ILD_00125231	0000.dat	IC, IE, NI, FN, OT, R
DTX1105	LIQ_PH-ILD_00125232	LIQ_PH-ILD_00125232	0001.dat	IC, IE, NI, FN, OT, R
DTX1106	LIQ_PH-ILD_00125233	LIQ_PH-ILD_00125233	LIQUI001_LTI-401_ASCENT_80086321_Coding_AE_2024-05-20.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1107	LIQ_PH-ILD_00125234	LIQ_PH-ILD_00125234	LIQUI001_LTI-401_ASCENT_80086321_Coding_MH_2024-05-20.ep.xlsx	IC, NI, FN, R, 403, A, H

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DTX1108	LIQ_PH-ILD_00125235	LIQ_PH-ILD_00125235	LIQUI001_LTI-401_ASCENT_80086321_Coding CM_2024-05-20.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1109	LIQ_PH-ILD_00125236	LIQ_PH-ILD_00125236	LIQUI001_LTI-401_ASCENT_80086321_Coding AE_2024-04-18.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1110	LIQ_PH-ILD_00125237	LIQ_PH-ILD_00125237	LIQUI001_LTI-401_ASCENT_80086321_Coding CM_2024-04-18.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1111	LIQ_PH-ILD_00125238	LIQ_PH-ILD_00125238	LIQUI001_LTI-401_ASCENT_80086321_Coding MH_2024-04-18.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1112	LIQ_PH-ILD_00125239	LIQ_PH-ILD_00125239	LIQUI001_LTI-401_ASCENT_80086321_Coding AE_2024-03-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1113	LIQ_PH-ILD_00125240	LIQ_PH-ILD_00125240	LIQUI001_LTI-401_ASCENT_80086321_Coding CM_2024-03-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1114	LIQ_PH-ILD_00125241	LIQ_PH-ILD_00125241	LIQUI001_LTI-401_ASCENT_80086321_Coding MH_2024-03-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1115	LIQ_PH-ILD_00125242	LIQ_PH-ILD_00125242	LIQUI001_LTI-401_ASCENT_80086321_Coding CM_2024-02-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1116	LIQ_PH-ILD_00125243	LIQ_PH-ILD_00125243	LIQUI001_LTI-401_ASCENT_80086321_Coding AE_2024-02-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1117	LIQ_PH-ILD_00125244	LIQ_PH-ILD_00125244	LIQUI001_LTI-401_ASCENT_80086321_Coding MH_2024-02-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1118	LIQ_PH-ILD_00125245	LIQ_PH-ILD_00125245	ASCENT Visit tracker_0767_Liquidia_26MAY2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1119	LIQ_PH-ILD_00125246	LIQ_PH-ILD_00125246	LTI-401_AE Report_03Jun2024.csv	IC, NI, FN, R, 403, A, H
DTX1120	LIQ_PH-ILD_00125247	LIQ_PH-ILD_00125247	LTI-401_AE Report_03Jun2024_AG modification.csv	IC, NI, FN, R, 403, A, H
DTX1121	LIQ_PH-ILD_00125248	LIQ_PH-ILD_00125248	FLUIDDA ASCENT Visit tracker_0767_Liquidia_04JUN2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1122	LIQ_PH-ILD_00125249	LIQ_PH-ILD_00125249	LTI-401_EDC Metrics_06Jun2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1123	LIQ_PH-ILD_00125250	LIQ_PH-ILD_00125250	0000.dat	IC, IE, NI, FN, OT, R
DTX1124	LIQ_PH-ILD_00125251	LIQ_PH-ILD_00125251	0001.dat	IC, IE, NI, FN, OT, R
DTX1125	LIQ_PH-ILD_00125252	LIQ_PH-ILD_00125252	LTI-401_EDC Metrics_20Jun2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1126	LIQ_PH-ILD_00125253	LIQ_PH-ILD_00125253	0000.dat	IC, IE, NI, FN, OT, R
DTX1127	LIQ_PH-ILD_00125254	LIQ_PH-ILD_00125254	0001.dat	IC, IE, NI, FN, OT, R
DTX1128	LIQ_PH-ILD_00125255	LIQ_PH-ILD_00125255	ASCENT Visit tracker_0767_Liquidia_20JUN2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1129	LIQ_PH-ILD_00125256	LIQ_PH-ILD_00125256	LIQUI001_LTI-401_ASCENT_80086321_Coding MH_2024-06-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1130	LIQ_PH-ILD_00125257	LIQ_PH-ILD_00125257	LIQUI001_LTI-401_ASCENT_80086321_Coding CM_2024-06-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1131	LIQ_PH-ILD_00125258	LIQ_PH-ILD_00125258	LIQUI001_LTI-401_ASCENT_80086321_Coding AE_2024-06-19.ep.xlsx	IC, NI, FN, R, 403, A, H
DTX1132	LIQ_PH-ILD_00125259	LIQ_PH-ILD_00125259	ASCENT Visit tracker_0767_Liquidia_02JUL2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1133	LIQ_PH-ILD_00125260	LIQ_PH-ILD_00125260	LTI-401_EDC Metrics_04Jul2024.xlsx	IC, NI, FN, R, 403, A, H
DTX1134	LIQ_PH-ILD_00125261	LIQ_PH-ILD_00125261	0000.dat	IC, IE, NI, FN, OT, R
DTX1135	LIQ_PH-ILD_00125262	LIQ_PH-ILD_00125262	0001.dat	IC, IE, NI, FN, OT, R
DTX1136	LIQ_PH-ILD_00125263	LIQ_PH-ILD_00125263	LTI-401_AE Report_01Jul2024.csv	IC, NI, FN, R, 403, A, H
DTX1137	LIQ_PH-ILD_00125264	LIQ_PH-ILD_00125264	ASCENT Dosing Tracker.xlsx	IC, NI, FN, R, 403, A, H
DTX1138	LIQ_PH-ILD_00125265	LIQ_PH-ILD_00125265	0000.dat	IC, IE, NI, FN, OT, R
DTX1139	LIQ_PH-ILD_00125266	LIQ_PH-ILD_00125348	2021.11.11.Liquidia BOD Meeting.pdf	A, C, FN, IC, 403, BE, H
DTX1140	LIQ_PH-ILD_00125349	LIQ_PH-ILD_00125355	CVrg Spotlight - PH-ILD - Jul 22.pptx	A, FN, H, R, IO
DTX1141	LIQ_PH-ILD_00125356	LIQ_PH-ILD_00125622	CVrgMktStrat-PH-2Q-2022.pdf	A, FN, H, R, IO
DTX1142	LIQ_PH-ILD_00125623	LIQ_PH-ILD_00125627	PH-ILD Pages from CVrgMktStrat-PH-2Q-2022-2.pdf	A, FN, H, R, IO
DTX1143	LIQ_PH-ILD_00125628	LIQ_PH-ILD_00125628	SN00102 Cover Letter_IB V08_20240214_signed.pdf	A, C, FN, FRE 106, H
DTX1144	LIQ_PH-ILD_00125629	LIQ_PH-ILD_00125632	FDA_1571_IB V08_20240214_signed.pdf	A, C, FN, FRE 106, H
DTX1145	LIQ_PH-ILD_00125633	LIQ_PH-ILD_00125633	cover.pdf	A, C, FN, FRE 106, H
DTX1146	LIQ_PH-ILD_00125634	LIQ_PH-ILD_00125634	esub-info.pdf	A, C, FN, FRE 106, H
DTX1147	LIQ_PH-ILD_00125635	LIQ_PH-ILD_00125635	index.xml	IC, IE, NI, FN, OT, R
DTX1148	LIQ_PH-ILD_00125636	LIQ_PH-ILD_00125636	index-md5.txt	IC, IE, NI, FN, OT, R
DTX1149	LIQ_PH-ILD_00125637	LIQ_PH-ILD_00125637	us-regional.xml	IC, IE, NI, FN, OT, R
DTX1150	LIQ_PH-ILD_00125638	LIQ_PH-ILD_00125719	ib-edition08.pdf	A, C, FN, FRE 106, H
DTX1151	LIQ_PH-ILD_00125720	LIQ_PH-ILD_00125720	Receipt for ind129819-sn0102.tar.gz.txt	A, C, FN, FRE 106, H
DTX1152	LIQ_PH-ILD_00125721	LIQ_PH-ILD_00125721	[Unnamed Unrecognised Item]	IC, IE, NI, FN, OT, R
DTX1153	LIQ_PH-ILD_00125722	LIQ_PH-ILD_00125722	[Unnamed Other Document]	IC, IE, NI, FN, OT, R

DTX1154	LIQ_PH-ILD_00125723	LIQ_PH-ILD_00125723	ci1707918351789.16656876@fdsahl86ceb432_te1.txt	A, C, FN, FRE 106, H
DTX1155	LIQ_PH-ILD_00125724	LIQ_PH-ILD_00125724	ci1707918351789.16656876@fdsahl86ceb432_te1.pdf	A, C, FN, FRE 106, H
DTX1156	LIQ_PH-ILD_00125725	LIQ_PH-ILD_00125726	20240410 Email to Agency requesting guidance.pdf	A, C, FN, FRE 106, H
DTX1157	LIQ_PH-ILD_00125727	LIQ_PH-ILD_00125728	20240410 LIQ to FDA Email NDA 213005.pdf	A, C, FN, FRE 106, H
DTX1158	LIQ_PH-ILD_00125729	LIQ_PH-ILD_00125731	20240412 FDA to LIQ Email Receipt Confirmation NDA 213005.pdf	A, C, FN, FRE 106, H
DTX1159	LIQ_PH-ILD_00125732	LIQ_PH-ILD_00125734	20240409 FDA to LIQ Email Regarding NDA 213005_SN0062.pdf	A, C, FN, FRE 106, H
DTX1160	LIQ_PH-ILD_00125735	LIQ_PH-ILD_00125736	20240409 FDA to LIQ Email Confirmation Regarding NDA 213005_SN0062.pdf	A, C, FN, FRE 106, H
DTX1161	LIQ_PH-ILD_00125737	LIQ_PH-ILD_00125737	20240405 LIQ to FDA Email Confirmation Regarding NDA 213005_SN0062.pdf	A, C, FN, FRE 106, H
DTX1162	LIQ_PH-ILD_00125738	LIQ_PH-ILD_00125742	20240328 FDA to LIQ Injunction Approvability Lifted.pdf	A, C, FN, FRE 106, H
DTX1163	LIQ_PH-ILD_00125743	LIQ_PH-ILD_00125744	20240402 LIQ to FDA Email Pending Approval.pdf	A, C, FN, FRE 106, H
DTX1164	LIQ_PH-ILD_00125745	LIQ_PH-ILD_00125745	20240328 FDA to LIQ Email Regarding Injunction Approvability Lifted.pdf	A, C, FN, FRE 106, H
DTX1165	LIQ_PH-ILD_00125746	LIQ_PH-ILD_00125746	20240520 LIQ to FDA Email NDA 213005 - Request for Meeting FDA.pdf	A, C, FN, FRE 106, H
DTX1166	LIQ_PH-ILD_00125747	LIQ_PH-ILD_00125748	20240710 FDA to LIQ Email Response Follow-up.pdf	A, C, FN, FRE 106, H, 403
DTX1167	LIQ_PH-ILD_00125749	LIQ_PH-ILD_00125749	32p32-batch-form_JUL2024.docx	A, C, FN, FRE 106, H
DTX1168	LIQ_PH-ILD_00125750	LIQ_PH-ILD_00125750	0000.dat	IC, IE, NI, FN, OT, R
DTX1169	LIQ_PH-ILD_00125751	LIQ_PH-ILD_00125752	32s41-contr-drug-sub_JUL2024.docx	A, C, FN, FRE 106, H
DTX1170	LIQ_PH-ILD_00125753	LIQ_PH-ILD_00125753	0000.dat	IC, IE, NI, FN, OT, R
DTX1171	LIQ_PH-ILD_00125754	LIQ_PH-ILD_00125783	32p34-contr-of-crit-steps_JUL2024.docx	A, C, FN, FRE 106, H
DTX1172	LIQ_PH-ILD_00125784	LIQ_PH-ILD_00125784	font1.odttf	IC, IE, NI, FN, OT, R
DTX1173	LIQ_PH-ILD_00125785	LIQ_PH-ILD_00125785	0000.dat	IC, IE, NI, FN, OT, R
DTX1174	LIQ_PH-ILD_00125786	LIQ_PH-ILD_00125787	32p31-manuf_JUL2024.docx	A, C, FN, FRE 106, H
DTX1175	LIQ_PH-ILD_00125788	LIQ_PH-ILD_00125788	0000.dat	IC, IE, NI, FN, OT, R
DTX1176	LIQ_PH-ILD_00125789	LIQ_PH-ILD_00125789	32S21-manuf_JUL2024.docx	A, C, FN, FRE 106, H
DTX1177	LIQ_PH-ILD_00125790	LIQ_PH-ILD_00125790	font1.odttf	IC, IE, NI, FN, OT, R
DTX1178	LIQ_PH-ILD_00125791	LIQ_PH-ILD_00125791	0000.dat	IC, IE, NI, FN, OT, R
DTX1179	LIQ_PH-ILD_00125792	LIQ_PH-ILD_00125798	32s45-justif-of-spec_JUL2024.docx	A, C, FN, FRE 106, H
DTX1180	LIQ_PH-ILD_00125799	LIQ_PH-ILD_00125799	0000.dat	IC, IE, NI, FN, OT, R
DTX1181	LIQ_PH-ILD_00125800	LIQ_PH-ILD_00125811	32p33-desc-mfg-process_JUL2024.docx	A, C, FN, FRE 106, H
DTX1182	LIQ_PH-ILD_00125812	LIQ_PH-ILD_00125812	0000.dat	IC, IE, NI, FN, OT, R
DTX1183	LIQ_PH-ILD_00125813	LIQ_PH-ILD_00125821	1.11.1 Quality Information Amendment.docx	A, C, FN, FRE 106, H, 403
DTX1184	LIQ_PH-ILD_00125822	LIQ_PH-ILD_00125822	1.4.2 YS Letter of Authorization.pdf	A, C, FN, FRE 106, H
DTX1185	LIQ_PH-ILD_00125823	LIQ_PH-ILD_00125823	SN0103 Cover Letter.docx	A, C, FN, FRE 106, H
DTX1186	LIQ_PH-ILD_00125824	LIQ_PH-ILD_00125824	0000.dat	IC, IE, NI, FN, OT, R
DTX1187	LIQ_PH-ILD_00125825	LIQ_PH-ILD_00125825	0001.dat	IC, IE, NI, FN, OT, R
DTX1188	LIQ_PH-ILD_00125826	LIQ_PH-ILD_00125826	0002.dat	IC, IE, NI, FN, OT, R
DTX1189	LIQ_PH-ILD_00125827	LIQ_PH-ILD_00125827	0003.dat	IC, IE, NI, FN, OT, R
DTX1190	LIQ_PH-ILD_00125828	LIQ_PH-ILD_00125828	0004.dat	IC, IE, NI, FN, OT, R
DTX1191	LIQ_PH-ILD_00125829	LIQ_PH-ILD_00125829	SN0103 Cover Letter.pdf	A, C, FN, FRE 106, H
DTX1192	LIQ_PH-ILD_00125830	LIQ_PH-ILD_00125833	FDA_1571_IND Amendment_30Jul20224_signed.pdf	A, C, FN, FRE 106, H
DTX1193	LIQ_PH-ILD_00125834	LIQ_PH-ILD_00125834	manufacturer.pdf	A, C, FN, FRE 106, H, R
DTX1194	LIQ_PH-ILD_00125835	LIQ_PH-ILD_00125835	ys-loa-dmf27680.pdf	A, C, FN, FRE 106, H
DTX1195	LIQ_PH-ILD_00125836	LIQ_PH-ILD_00125837	manufacturers.pdf	A, C, FN, FRE 106, H, R
DTX1196	LIQ_PH-ILD_00125838	LIQ_PH-ILD_00125838	batch-formula.pdf	A, C, FN, FRE 106, H
DTX1197	LIQ_PH-ILD_00125839	LIQ_PH-ILD_00125839	index.xml	IC, IE, NI, FN, OT, R

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DTX1198	LIQ_PH-ILD_00125840	LIQ_PH-ILD_00125851	manuf-process-and-controls.pdf	A, C, FN, FRE 106, H
DTX1199	LIQ_PH-ILD_00125852	LIQ_PH-ILD_00125852	cover.pdf	A, C, FN, FRE 106, H
DTX1200	LIQ_PH-ILD_00125853	LIQ_PH-ILD_00125853	index-md5.txt	IC, IE, NI, FN, OT, R
DTX1201	LIQ_PH-ILD_00125854	LIQ_PH-ILD_00125855	specification.pdf	A, C, FN, FRE 106, H
DTX1202	LIQ_PH-ILD_00125856	LIQ_PH-ILD_00125856	esub-info.pdf	A, C, FN, FRE 106, H
DTX1203	LIQ_PH-ILD_00125857	LIQ_PH-ILD_00125886	control-critical-steps.pdf	A, C, FN, FRE 106, H
DTX1204	LIQ_PH-ILD_00125887	LIQ_PH-ILD_00125887	us-regional.xml	IC, IE, NI, FN, OT, R
DTX1205	LIQ_PH-ILD_00125888	LIQ_PH-ILD_00125895	quality.pdf	A, C, FN, FRE 106, H
DTX1206	LIQ_PH-ILD_00125896	LIQ_PH-ILD_00125902	justification-of-specification.pdf	A, C, FN, FRE 106, H
DTX1207	LIQ_PH-ILD_00125903	LIQ_PH-ILD_00125903	Receipt for ind129819-sn0103.tar.gz.txt	A, C, FN, FRE 106, H
DTX1208	LIQ_PH-ILD_00125904	LIQ_PH-ILD_00125904	[Unnamed Unrecognised Item]	IC, IE, NI, FN, OT, R
DTX1209	LIQ_PH-ILD_00125905	LIQ_PH-ILD_00125905	[Unnamed Other Document]	IC, IE, NI, FN, OT, R
DTX1210	LIQ_PH-ILD_00125906	LIQ_PH-ILD_00125906	ci1722354715158.1580548@fdsahl86ceb40a_te2.txt	A, C, FN, FRE 106, H
DTX1211	LIQ_PH-ILD_00125907	LIQ_PH-ILD_00125907	ci1722354715158.1580548@fdsahl86ceb40a_te2.pdf	A, C, FN, FRE 106, H
DTX1212	LIQ_PH-ILD_00125908	LIQ_PH-ILD_00125935	Advice Letter Liquidia.pdf	A, C, FN, FRE 106, H
DTX1213	LIQ_PH-ILD_00125936	LIQ_PH-ILD_00125975	NDA 213005 Exclusivity Advice Letter.pdf	A, C, FN, FRE 106, H
DTX1214	LIQ_PH-ILD_00125976	LIQ_PH-ILD_00126014	NDA 213005 Tentative Approval.pdf	A, C, FN, FRE 106, H
DTX1215	LIQ_PH-ILD_00126015	LIQ_PH-ILD_00126015	20240816 FDA Action Email .pdf	A, C, FN, FRE 106, H
DTX1216	LIQ_PH-ILD_00126016	LIQ_PH-ILD_00126016	image001.png	A, C, FN, FRE 106, H
DTX1217	LIQ_PH-ILD_00126017	LIQ_PH-ILD_00126055	NDA 213005 Tentative Approval.pdf	A, C, FN, FRE 106, H
DTX1218	LIQ_PH-ILD_00126056	LIQ_PH-ILD_00126095	NDA 213005 Exclusivity Advice Letter.pdf	A, C, FN, FRE 106, H
DTX1219	LIQ_PH-ILD_00126096	LIQ_PH-ILD_00126123	Advice Letter Liquidia.pdf	A, C, FN, FRE 106, H
DTX1220	LIQ_PH-ILD_00126124	LIQ_PH-ILD_00126126	FW: CVrg's PH Market Strategies report updated through 1Q 2022	A, C, FN, IC, 403, BE, H
DTX1221	LIQ_PH-ILD_00126127	LIQ_PH-ILD_00126377	CVrgMktStrat-PH-1Q-2022.pdf	A, FN, H, R, IO
DTX1222	LIQ_PH-ILD_00126378	LIQ_PH-ILD_00126500	CVrgMktStrat-PH-1Q-2022 - selected slides.pptx	A, FN, H, R, IO
DTX1223	LIQ_PH-ILD_00126501	LIQ_PH-ILD_00126508	FW: CVrg's PH Market Strategies report updated through 1Q 2022	A, C, FN, IC, 403, BE, H
DTX1224	LIQ_PH-ILD_00126509	LIQ_PH-ILD_00126509	CVrgConf-ATS2022 percent treated excerpt.pptx	A, FN, H, R, IO
DTX1225	LIQ_PH-ILD_00126510	LIQ_PH-ILD_00126760	CVrgMktStrat-PH-1Q-2022.pdf	A, FN, H, R, IO
DTX1226	LIQ_PH-ILD_00126761	LIQ_PH-ILD_00126763	FW: CVrg's PH Market Strategies report updated through 1Q 2022	A, C, FN, IC, 403, BE, H
DTX1227	LIQ_PH-ILD_00126764	LIQ_PH-ILD_00127014	CVrgMktStrat-PH-1Q-2022.pdf	A, FN, H, R, IO
DTX1228	LIQ_PH-ILD_00127015	LIQ_PH-ILD_00127281	CVrgMktStrat-PH-2Q-2022.pdf	A, FN, H, R, IO
DTX1229	LIQ_PH-ILD_00127282	LIQ_PH-ILD_00127282	CVrg ATS itinerary	A, FN, H, R, IO
DTX1230	LIQ_PH-ILD_00127283	LIQ_PH-ILD_00127283	CVrg Conference ATS 2023 itinerary.xlsx	A, FN, H, R, IO
DTX1231	LIQ_PH-ILD_00127284	LIQ_PH-ILD_00127284	CVrg Conference ATS 2023 itinerary.xlsx	A, FN, H, R, IO
DTX1232	LIQ_PH-ILD_00127285	LIQ_PH-ILD_00127285	ASCENT PROs as of 041424.csv	IC, NI, FN, R, 403, A, H
DTX1233	LIQ_PH-ILD_00127286	LIQ_PH-ILD_00127286	ASCENT PROs as of 041424.xlsx	IC, NI, FN, R, 403, A, H
DTX1234	LIQ_PH-ILD_00127287	LIQ_PH-ILD_00127287	ASCENT Dosing Tracker 062124_Savan.xlsx	IC, NI, FN, R, 403, A, H
DTX1235	LIQ_PH-ILD_00127288	LIQ_PH-ILD_00127288	CVrg CI and strategy support for PH	A, C, FN, IC, 403, BE, H
DTX1236	LIQ_PH-ILD_00127289	LIQ_PH-ILD_00127306	Sample Report - CVrgSentinel-PH-August-2021PW.pdf	A, FN, H, R, IO
DTX1237	LIQ_PH-ILD_00127307	LIQ_PH-ILD_00127321	Sample Report - CVrgConf-ATS2021.pdf	A, FN, H, R, IO
DTX1238	LIQ_PH-ILD_00127322	LIQ_PH-ILD_00127323	RE: CVrg CI and strategy support for PH	A, C, FN, IC, 403, BE, H
DTX1239	LIQ_PH-ILD_00127324	LIQ_PH-ILD_00127339	Sample Pages CVrgMktStrat-PH-3Q-2021-2030PW.pdf	A, FN, H, R, IO
DTX1240	LIQ_PH-ILD_00127340	LIQ_PH-ILD_00127354	Sample Report - CVrgSentinel-PH-October-2021.pdf	A, FN, H, R, IO
DTX1241	LIQ_PH-ILD_00127355	LIQ_PH-ILD_00127357	FW: CVrg's PH Market Strategies report updated through 1Q 2022	A, C, FN, IC, 403, BE, H
DTX1242	LIQ_PH-ILD_00127358	LIQ_PH-ILD_00127608	CVrgMktStrat-PH-1Q-2022.pdf	A, FN, H, R, IO
DTX1243	LIQ_PH-ILD_00127609	LIQ_PH-ILD_00127875	CVrgMktStrat-PH-2Q-2022.pdf	A, FN, H, R, IO

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DTX1244	LIQ_PH-ILD_00127876	LIQ_PH-ILD_00127876	FW: CVrg's PH Market Strategies report updated through 1Q 2022	A, C, FN, IC, 403, BE, H
DTX1245	LIQ_PH-ILD_00127877	LIQ_PH-ILD_00128127	CVrgMktStrat-PH-1Q-2022.pdf	A, FN, H, R, IO
DTX1246	LIQ_PH-ILD_00128128	LIQ_PH-ILD_00128394	CVrgMktStrat-PH-2Q-2022.pdf	A, FN, H, R, IO
DTX1247	LIQ_PH-ILD_00128395	LIQ_PH-ILD_00128397	FW: CVrg Market Strategies : Pulmonary Hypertension (Q2 2022)	A, C, FN, IC, 403, BE, H
DTX1248	LIQ_PH-ILD_00128398	LIQ_PH-ILD_00128664	CVrgMktStrat-PH-2Q-2022.pdf	A, FN, H, R, IO
DTX1249	LIQ_PH-ILD_00128665	LIQ_PH-ILD_00128803	CVrgMktStrat-PH 2Q 2022 - selected slides.pptx	A, FN, H, R, IO
DTX1250	LIQ_PH-ILD_00128804	LIQ_PH-ILD_00128806	FW: CVrg's PH Market Strategies report updated through 1Q 2022	A, C, FN, IC, 403, BE, H
DTX1251	LIQ_PH-ILD_00128807	LIQ_PH-ILD_00129057	CVrgMktStrat-PH-1Q-2022.pdf	A, FN, H, R, IO
DTX1252	LIQ_PH-ILD_00129058	LIQ_PH-ILD_00129324	CVrgMktStrat-PH-2Q-2022.pdf	A, FN, H, R, IO
DTX1253	LIQ_PH-ILD_00129325	LIQ_PH-ILD_00129326	FW: CVrg 2023 PAH support	A, C, FN, IC, 403, BE, H
DTX1254	LIQ_PH-ILD_00129327	LIQ_PH-ILD_00129327	Liquidia_CVrg Conference ACC 2023 preliminary itinerary.xlsx	A, FN, H, R, IO
DTX1255	LIQ_PH-ILD_00129328	LIQ_PH-ILD_00129345	Sample Report - CVrgSentinel-PH-January-2023PW.pdf	A, FN, H, R, IO
DTX1256	LIQ_PH-ILD_00129346	LIQ_PH-ILD_00129347	FW: CVrg 2023 PAH support	A, C, FN, IC, 403, BE, H
DTX1257	LIQ_PH-ILD_00129348	LIQ_PH-ILD_00129348	Liquidia_CVrg Conference ACC 2023 preliminary itinerary.xlsx	A, FN, H, R, IO
DTX1258	LIQ_PH-ILD_00129349	LIQ_PH-ILD_00129366	Sample Report - CVrgSentinel-PH-January-2023PW.pdf	A, FN, H, R, IO
DTX1259	LIQ_PH-ILD_00129367	LIQ_PH-ILD_00129367	FW: Emailing: CVrgMktStrat-PH-2Q-2022.pdf	A, C, FN, IC, 403, BE, H
DTX1260	LIQ_PH-ILD_00129368	LIQ_PH-ILD_00129634	CVrgMktStrat-PH-2Q-2022.pdf	A, FN, H, R, IO
DTX1261	LIQ_PH-ILD_00129635	LIQ_PH-ILD_00129636	Liquidia Welcome to CVrg Support!	A, FN, H, R, IO
DTX1262	LIQ_PH-ILD_00129637	LIQ_PH-ILD_00129886	CVrgMktStrat-PH-4Q-2022.pdf	A, FN, H, R, IO
DTX1263	LIQ_PH-ILD_00129887	LIQ_PH-ILD_00129908	CVrgSentinel-PH-February-2023.pptx	A, FN, H, R, IO
DTX1264	LIQ_PH-ILD_00129909	LIQ_PH-ILD_00129909	CVrg Sentinel : Pulmonary Hypertension (MAR 2023)	A, FN, H, R, IO
DTX1265	LIQ_PH-ILD_00129910	LIQ_PH-ILD_00129929	CVrgSentinel-PH-March-2023.pptx	A, FN, H, R, IO
DTX1266	LIQ_PH-ILD_00129930	LIQ_PH-ILD_00129934	PH-ILD Pages from CVrgMktStrat-PH-2Q-2022-2.pdf	A, FN, H, R, IO
DTX1267	LIQ_PH-ILD_00129935	LIQ_PH-ILD_00129935	CVrg Market Strategies : Pulmonary Hypertension (Q1 2023)	A, FN, H, R, IO
DTX1268	LIQ_PH-ILD_00129936	LIQ_PH-ILD_00130174	CVrgMktStrat-PH-1Q-2023.pdf	A, FN, H, R, IO
DTX1269	LIQ_PH-ILD_00130175	LIQ_PH-ILD_00130175	CVrg Sentinel : Pulmonary Hypertension (APR 2023)	A, FN, H, R, IO
DTX1270	LIQ_PH-ILD_00130176	LIQ_PH-ILD_00130199	CVrgSentinel-PH-April-2023.pptx	A, FN, H, R, IO
DTX1271	LIQ_PH-ILD_00130200	LIQ_PH-ILD_00130200	FW: CVrg Sentinel : Pulmonary Hypertension (APR 2023)	A, C, FN, IC, 403, BE, H
DTX1272	LIQ_PH-ILD_00130201	LIQ_PH-ILD_00130224	CVrgSentinel-PH-April-2023.pptx	A, FN, H, R, IO
DTX1273	LIQ_PH-ILD_00130225	LIQ_PH-ILD_00130226	FW: CVrg Sentinel : Pulmonary Hypertension (APR 2023)	A, C, FN, IC, 403, BE, H
DTX1274	LIQ_PH-ILD_00130227	LIQ_PH-ILD_00130250	CVrgSentinel-PH-April-2023.pptx	A, FN, H, R, IO
DTX1275	LIQ_PH-ILD_00130251	LIQ_PH-ILD_00130251	CVrg Conference ATS 2023 itinerary.xlsx	A, FN, H, R, IO
DTX1276	LIQ_PH-ILD_00130252	LIQ_PH-ILD_00130253	FW: CVrg ATS itinerary	A, C, FN, IC, 403, BE, H
DTX1277	LIQ_PH-ILD_00130254	LIQ_PH-ILD_00130254	CVrg Conference ATS 2023 itinerary.xlsx	A, FN, H, R, IO
DTX1278	LIQ_PH-ILD_00130255	LIQ_PH-ILD_00130255	from CVrG re: PH-ILD epi	A, C, FN, IC, 403, BE, H
DTX1279	LIQ_PH-ILD_00130256	LIQ_PH-ILD_00130257	Fwd: CVrg ATS itinerary	A, C, FN, IC, 403, BE, H
DTX1280	LIQ_PH-ILD_00130258	LIQ_PH-ILD_00130258	CVrg Conference ATS 2023 itinerary.xlsx	A, FN, H, R, IO
DTX1281	LIQ_PH-ILD_00130259	LIQ_PH-ILD_00130259	CVrg Conference Report: ATS 2023	A, FN, H, R, IO
DTX1282	LIQ_PH-ILD_00130260	LIQ_PH-ILD_00130287	CVrgConf-ATS-2023.pptx	A, FN, H, R, IO
DTX1283	LIQ_PH-ILD_00130288	LIQ_PH-ILD_00130315	CVrgConf-ATS-2023.pdf	A, FN, H, R, IO
DTX1284	LIQ_PH-ILD_00130316	LIQ_PH-ILD_00130316	CVrg Sentinel : Pulmonary Hypertension (MAY 2023)	A, FN, H, R, IO
DTX1285	LIQ_PH-ILD_00130317	LIQ_PH-ILD_00130332	CVrgSentinel-PH-May-2023.pptx	A, FN, H, R, IO
DTX1286	LIQ_PH-ILD_00130333	LIQ_PH-ILD_00130333	CVrg Sentinel : Pulmonary Hypertension (JUNE 2023)	A, FN, H, R, IO
DTX1287	LIQ_PH-ILD_00130334	LIQ_PH-ILD_00130350	CVrgSentinel-PH-June-2023.pptx	A, FN, H, R, IO
DTX1288	LIQ_PH-ILD_00130351	LIQ_PH-ILD_00130351	CVrg Market Strategies : Pulmonary Hypertension (Q2 2023)	A, FN, H, R, IO
DTX1289	LIQ_PH-ILD_00130352	LIQ_PH-ILD_00130593	CVrgMktStrat-PH-2Q-2023.pdf	A, FN, H, R, IO

DEFENDANT'S TRIAL EXHIBIT LIST

DTX1290	LIQ_PH-ILD_00130594	LIQ_PH-ILD_00130619	LQDA BOD Aug 2023 - Pre-read 2023.07.27.pptx	A, C, FN, IC, 403, BE, H
DTX1291	LIQ_PH-ILD_00130620	LIQ_PH-ILD_00130645	LQDA BOD Aug 2023 - Pre-read 2023.07.28 0700.pptx	A, C, FN, IC, 403, BE, H
DTX1292	LIQ_PH-ILD_00130646	LIQ_PH-ILD_00130646	CVrg Sentinel : Pulmonary Hypertension (JULY 2023)	A, FN, H, R, IO
DTX1293	LIQ_PH-ILD_00130647	LIQ_PH-ILD_00130667	CVrgSentinel-PH-July-2023.pptx	A, FN, H, R, IO
DTX1294	LIQ_PH-ILD_00130668	LIQ_PH-ILD_00130668	CVrg Sentinel : Pulmonary Hypertension (AUGUST 2023)	A, FN, H, R, IO
DTX1295	LIQ_PH-ILD_00130669	LIQ_PH-ILD_00130686	CVrgSentinel-PH-August-2023.pptx	A, FN, H, R, IO
DTX1296	LIQ_PH-ILD_00113806	LIQ_PH-ILD_00113809	July 25, 2023 Email from R. Jeffs to Liquidia Board	A, C, FN, IC, IE, 403, BE, H, R
DTX1297	LIQ_PH-ILD_00142130	LIQ_PH-ILD_00142362	Liquidia June 30, 2023 FORM 10-Q	R, 403, H
DTX1298	LIQ_PH-ILD_00142363	LIQ_PH-ILD_00142458	Liquidia Sept. 30, 2023 FORM 10-Q	R, 403, H

Code	Objection
FRE 106	
403	Prejudice, Confusion, Waste of Time: Probative value is substantially outweighed by unfair prejudice and/or confusion of the issues (FRE 403)
408	Compromise/Offers to Compromise (offer or discussion for settlement or compromise)
A	Authentication: It is a forgery or is not what it purports to be. Document not properly authenticated or identified. Testimony objectionable because it concerns a document for which authentication is lacking (FRE 901, 902)
AF	Assumes facts not in evidence
B	Improper bolstering of the credibility of a witness, such as before credibility is attacked. (FRE 607, 608, 801(d)(1)(B))
BE	Best Evidence Rule, Original Document, Other Content Evidence (FRE 1001, 1002, 1003, 1004)
BRPL	Brief, Pleading, or Order: It is a brief, pleading, order, or discovery request and is not evidence
C	Cumulative: It is duplicative and/or cumulative of other exhibits (FRE 401, 402, 403, 1001, 1002, 1003)
Dep	Inaccurate or misleading description of deposition exhibit or trial transcript
Expert	Improper Use of Expert Report; insufficient disclosure in expert report (FRCP 26, FRE 611(b))
F	Form
FL	Foreign Language Without Translation
FN	Lacks foundation/personal knowledge (FRE 602, 701, 702, 901)
H	Hearsay, including hearsay within hearsay (FRE 801, 802, 805)
IC	Incomplete/Compilation (document or testimony) (FRE 106, 401, 402, 403, 611, 901, 1006)
IE	Improper exhibit/not evidence (FRE 401, 402, 403, 901)
IO	Improper Opinion (FRE 701/702)
LC	Conclusion of Law: Contains conclusions of law
MIL	Subject of pending or agreed-upon MIL or to Court order relating to evidence
MIS	Misleading, misstates prior testimony, mischaracterizes testimony or evidence, including assuming fact not in evidence (FRE 611(a))
NI	Not sufficiently identified or relied upon (FRCP 26, 34)
OT	Obscured Text/Illegible, Exhibit, as submitted, is illegible or otherwise of low quality (FRE 403)
Priv	Privileged: Protected from disclosure by the attorney-client privilege and/or work product doctrine (FRE 501, 502)
Privacy	Contains private personal information protected from disclosure under relevant law
R	Relevance: Not relevant to any issue to be decided in this case (FRE 401, 402, 403)
U	Untimely/never produced: Exhibit was not disclosed at the proper time (FRCP 26, 37, FRE 403)

EXHIBIT 12

JTX	Description	BegBates	EndBates	Corresponding PTX	Corresponding DTX
JTX-0001	U.S. Patent No. 11,826,327	UTC_PH-ILD_005310	UTC_PH-ILD_005360	PTX-0145	DTX0001
JTX-0002	U.S. Patent No. 11,826,327 File History	UTC_PH-ILD_011016	UTC_PH-ILD_013161	PTX-0946	

EXHIBIT 13

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS
CORPORATION,

Plaintiff,

v.

LIQUIDIA TECHNOLOGIES, INC.,

Defendant.

C.A. No. 23-00975-RGA-SRF

EXHIBIT 13: PLAINTIFF'S STATEMENT OF ADDITIONAL MATTERS

I. UTC’s Pending FRCP 72(a) Objections Related to Liquidia’s Late Disclosure of Invalidity Theories

1. UTC’s objections to Judge Fallon’s January 28, 2025 order denying UTC’s motion to strike Liquidia’s untimely invalidity contentions (D.I. 248) is currently pending before this Court. UTC’s objections assert that Judge Fallon improperly applied *Pennypack* and misread the Scheduling Order. D.I. 258. Liquidia filed its response on February 25, 2025 (D.I. 260) and briefing is complete.

II. Ongoing Discovery Following Liquidia’s Late Disclosure of Invalidity Theories

2. The parties are still engaged in limited supplemental discovery concerning Liquidia’s late-disclosed invalidity theories that will be completed on June 9, 2025. On December 18, 2024 UTC filed a motion to strike Liquidia’s invalidity contentions served after the close of fact discovery. D.I. 234; D.I. 241. Following multiple rounds of briefing, on March 28, 2025 Judge Fallon entered an order setting a timeline for supplementation of discovery. D.I. 274.

3. Pursuant to the order, UTC deposed Dr. Rajan Saggar on April 11, 2025.

4. The order also permits UTC to submit a 5 page supplemental expert report applying the supplemental deposition testimony to its rebuttal positions no later than May 23, 2025. To the extent UTC submits a supplemental expert report, Liquidia may submit a 5 page response no later than June 9, 2025. No depositions related to any supplemental reports are permitted, and the parties can use the supplemental deposition testimony at trial.

III. Pending *Daubert* Motions

5. Both parties filed *Daubert* motions. Liquidia’s *Daubert* challenges seek to exclude (1) the opinions and testimony of UTC’s expert Dr. Thisted regarding infringement and validity (D.I. 278); (2) certain opinions and testimony of UTC’s expert Dr. Wertheim (D.I. 280); and (3) certain opinions and testimony of UTC’s experts Drs. Nathan and Thisted (D.I. 282). UTC’s

Daubert challenges seek to (1) exclude certain testimony of Liquidia’s expert Dr. Hill (D.I. 284); and (2) conditionally exclude certain testimony of Liquidia’s expert Dr. Ogenstad (D.I. 286).

6. Pursuant to Judge Fallon’s order entered December 6, 2024 (D.I. 225) *Daubert* briefing will be completed by May 8, 2025.

IV. Inequitable Conduct Evidence

7. On January 9, 2025 UTC moved for leave to file a motion for summary judgment of no inequitable conduct. D.I. 238. Following briefing on the issue, the Court ruled that “it would be more efficient to have an inequitable conduct trial and make whatever credibility and other judgments [it] need[s] to make based on live testimony.” D.I. 254. In the order the Court further ruled that it did “not consider the possibility that Liquidia may launch and give UTC a right to a jury trial on some issues as having any impact on what is a bench issue.” To the extent there may be a jury trial in this case at some point, UTC maintains that any inequitable conduct evidence should be shielded from the jury and presented in a separate bench trial on inequitable conduct.

V. Prior Motions to Strike Expert Reports

8. UTC and Liquidia each have pending requests to strike portions of certain expert reports. On April 1, 2025 the parties submitted a joint motion to resolve discovery disputes. D.I. 276. In the motion Liquidia requested an order striking certain portions of the Reply Expert Report of Dr. Ronald A. Thisted and UTC requested an order striking certain portions of the Reply Expert Report of Dr. Nicholas Hill and the Expert report of Dr. Stephen Ogenstad. All reports implicated by this motion were served in the reply round on February 21, 2025.

9. On April 2, 2025 Judge Fallon entered an order regarding the discovery dispute. D.I. 277. Pursuant to the order, briefing regarding the dispute was completed by April 23, 2025.

10. On April 29, 2025 Judge Fallon issued an order denying the parties' motions to strike. D.I. 304. UTC reserves the right to object to Judge Fallon's order or otherwise reraise the issues contained in UTC's motion to strike prior to trial.

VI. UTC Recommends Truncating the Trial in this Case to Two Days

11. Under the operative March 15, 2024 Scheduling Order, the trial in this case is currently set for three days, June 23-25, 2025. D.I. 45. UTC proposes shortening this trial from three days to two days, with any closing argument permitted by the Court to occur on the third day.

12. During the pleadings stage, the case involved two asserted patents. Now, this case involves only a single patent and one asserted independent claim, and the remaining issues in this case have been sharpened through the course of discovery and this litigation. UTC believes that two days is sufficient for the parties to present their cases on infringement and validity, with the time equally split between the parties. UTC expects to put on its own evidence and opening argument in less than a single trial day, or 7 hours. UTC further believes that two days is adequate in view of the Court's May 21, 2025 Oral Order requiring UTC to reduce its asserted claims to no more than six, and for Liquidia to reduce its asserted invalidity / unenforceability defenses / counterclaims to no more than four. *See* D.I. 317.

13. Shortening the length of the trial will conserve judicial resources, encourage efficient presentations by the parties, and is appropriately tailored to the issues to be presented at trial. Indeed, this Court has previously held a two-day trial in an ANDA case. *See Novartis Pharms. Corp. v. Mylan Inc.*, No. CV 14-777-RGA, 2015 WL 1246285, at *1 (D. Del. Mar. 16, 2015) ("I held a fourteen hour trial in May 2014 [regarding Case No. 11-1077]"); *id.* at *1 ("I held a fourteen hour trial in December 2014 [regarding Case No. 13-527]"); *Eagle Pharms., Inc. v.*

Slayback Pharma LLC, No. CV 21-1256-CFC-JLH, 2022 WL 14460937, at *1 (D. Del. Oct. 25, 2022), *aff'd*, No. 2023-1110, 2024 WL 163341 (Fed. Cir. Jan. 16, 2024) (“At the parties’ request, I scheduled two days for a bench trial.”).

VII. UTC Reserves Its Rights Regarding Damages

14. UTC does not currently seek damages and is not yet in a position to evaluate possible damages, as there has been no commercial launch of Defendant’s proposed product and Defendant has not produced sufficient material for UTC to assess damages if Defendant were to launch its proposed product.

15. Defendant’s proposed product, Yutrepia™, is currently set to receive final approval from the U.S. Food and Drug Administration on May 23, 2025. During discovery, UTC sought damages-related discovery; Liquidia objected and refused to produce damages-related documents on the basis that Yutrepia™ had not launched.

16. Liquidia repeatedly promised in discovery correspondence to produce certain damages-related documents and produce certain witnesses for depositions if and when Yutrepia launches: On August 2, 2024 Liquidia sent a letter¹ to UTC indicating that: (1) “Regarding UTC’s damages theories, Liquidia has already agreed to produce its actual financial information once Yutrepia® launches;” (2) “Liquidia is willing to produce documents responsive to [damages-related RFPs], if and when Liquidia launches, without limiting to a ‘sufficient to show’ basis;” and (3) “Liquidia is willing to produce actual formulary placement information if and when such formulary placement occurs.” On July 31, 2024 Liquidia reconfirmed to UTC via email that “Once Liquidia launches Yutrepia, Liquidia will produce financial documents reflecting actual sales, revenue, pricing, etc.” Again, on October 24, 2024 Liquidia informed UTC via email that Liquidia

¹ Communications between the parties can be provided to the Court upon request.

would “not offer Scott Moomaw, Michelle Gallant, or Matt Snow for depositions as it appears UTC is seeking their depositions on issues related to damages, which, as you are well aware, is not an issue in this case.”

17. On November 19, 2024, in response to Judge Fallon’s order compelling the production of sales projections and market forecasts relating to PH-ILD (D.I. 193 at 9), Liquidia produced [REDACTED]

[REDACTED] did not enable UTC to make any meaningful assessment of damages and Liquidia’s commercial success projections. As Judge Fallon ordered, “Should Defendant launch Yutrepia™ before this case concludes, Plaintiff may pursue a claim for damages against Defendant if it prevails on its infringement claims.” (D.I. 193 at 7). UTC reserves the right to do so.

18. On December 20, 2024 UTC informed Liquidia via email that “upon any at-risk commercial launch by Liquidia of Yutrepia to treat PH-ILD, UTC intends, expects, and reserves the right to obtain an agreed-upon schedule for Liquidia’s damages document productions, fact depositions, the parties’ damages expert discovery, and a trial on damages (as Liquidia has previously proposed).”

19. On December 23, 2024 Liquidia informed UTC that “Liquidia will abide by its commitment to produce sales information if and when Yutrepia launches” and cited *Astellas Pharma Inc. v. Sandoz Inc.*, 1-20-cv-01589, 2024 WL 4554799 (D. Del. Oct. 22, 2024). In that case the Court concluded “that the issues arising from the Generics Manufacturers’ launch of their competing product are best addressed in a separate action.” *Id.* at *1.

20. UTC reserves its right to seek damages if and when Liquidia engages in the

commercial manufacture, use, sale, offer to sell, and/or importation into the United States of its Yutrepia product. UTC further reserves its right to seek damages for any infringing conduct by or attributable to Defendant that falls outside of the 35 U.S.C. §271(e)(1) safe harbor and to seek attorneys' fees, costs, and expenses.

EXHIBIT 14

EXHIBIT 14

**THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS
CORPORATION,

v.
Plaintiff

LIQUIDIA TECHNOLOGIES, INC.,

Defendant.

C.A. No. 1:23-cv-00975-RGA
[REDACTED]

**DEFENDANT'S RESPONSES TO UTC'S REVISED STATEMENT OF
ADDITIONAL MATTERS**

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DEFENDANT'S RESPONSE TO UTC'S ADDITIONAL MATTERS

Defendant Liquidia Technologies, Inc. (“Liquidia”) provides the following responses to Plaintiff United Therapeutics Corporation’s (“UTC”) Revised Statement of Additional Matters, served on May 12, 2025. Liquidia reserves the right to revise, amend, supplement, or modify its response based upon any pretrial rulings by the Court and/or to address any additional matters raised by any pretrial order, meet and confers or other negotiations between the parties, pending and anticipated motions, and similar developments. Liquidia further reserves the right to supplement this response to rebut or otherwise address any additional matters identified by Plaintiff. Subject to this reservation of rights, Liquidia responds to UTC’s Statement of Additional Matters as follows:

I. Response to UTC’s Revised Statement Regarding Prior Motions to Strike Expert Reports

1. On April 29, 2025, Judge Fallon denied, without prejudice, UTC’s request to strike certain portions of the Reply Expert Report of Dr. Nicholas Hill and the Expert Report of Dr. Stephan Ogenstad, and Liquidia’s request to strike certain portions of the Reply Expert Report of Dr. Ronald A. Thisted. *See* D.I. 304.

2. Accordingly, Liquidia understands that the UTC’s statement regarding the parties’ motions to strike expert reports is no longer an additional matter in this case. However, Liquidia reserves the right to address objections to Judge Fallon’s order or the issues contained in Liquidia’s motion to strike if UTC raises the issue prior to trial.

II. Response to UTC’s Revised Statement Regarding Pending Daubert Motions

3. With respect to ¶ 5 of UTC’s Revised Statement of Additional Matters, Liquidia agrees with UTC that the five *Daubert* motions currently pending before the Court include: (1) Liquidia’s *Daubert* motion to exclude the opinions and testimony of Dr. Ronald A. Thisted

regarding infringement and validity (*see* D.I. 278); (2) Liquidia’s *Daubert* motion to exclude certain opinions and testimony of Dr. Bradley M. Wertheim (*see* D.I. 280); (3) Liquidia’s *Daubert* motion to exclude certain opinions and testimony of Drs. Nathan and Thisted (*see* D.I. 282); (4) UTC’s *Daubert* motion to exclude expert testimony of Dr. Nicholas Hill (*see* D.I. 284); and (5) UTC’s *Daubert* conditional motion to exclude expert testimony of Dr. Stephan Ogenstad, Ph.D. (*see* D.I. 286).

4. With respect to ¶ 6 of UTC’s Statement of Additional Matters, Liquidia notes that pursuant to Judge Fallon’s order entered December 6, 2024 (D.I. 225), the parties completed *Daubert* briefing on May 8, 2025. *See* D.I. 310; D.I. 311; D.I. 312; D.I. 313; D.I. 314. On May 14, 2025, Liquidia requested oral argument on its *Daubert* motions. *See* D.I. 315.

III. Response to UTC’s Revised Statement Regarding Ongoing Discovery

5. With respect to ¶ 2 of UTC’s Revised Statement of Additional Matters, Liquidia disagrees that the parties are still engaged in limited supplemental discovery. On January 28, 2025, Judge Fallon entered an order that denied, without prejudice, UTC’s motion to strike Liquidia’s Final Invalidity Contentions (D.I. 234) because “Plaintiff [had] not shown that Defendant failed to satisfy the scheduling order deadlines.” *See* D.I. 248, ¶ 2; *see also* D.I. 242. Pursuant to the same order (D.I. 248), the parties filed a Joint Motion to Resolve Discovery Dispute (D.I. 270) wherein the parties provided competing proposals in response to Judge Fallon’s denial of UTC’s motion to strike. Judge Fallon subsequently entered an order on March 28, 2025, adopting Liquidia’s proposal of reopening certain depositions for a limited number of witnesses and a narrow supplementation of expert reports. *See* D.I. 274. Pursuant to Judge Fallon’s March 28, 2025 Order, UTC proceeded with deposing Dr. Rajan Saggar on April 11, 2025. Although UTC was also permitted to depose other witnesses—including Dr. Victor Tapson, Kevin Laliberte, Michael Wade, and Kiernan DeAngelis—UTC informed Liquidia on April 15, 2025, that UTC did not

intend to reopen any other depositions under Judge Fallon’s March 28, 2025 Order. *See D.I. 293-1.* Thus, limited supplemental fact discovery is closed.

6. With respect to ¶ 3 of UTC’s Revised Statement of Additional Matters, Liquidia notes that UTC has filed Objections to Judge Fallon’s order denying UTC’s motion to strike on February 11, 2025 (D.I. 258), and Liquidia filed its Response to UTC’s Objections on February 25, 2025 (D.I. 260). Liquidia filed a Notice of Supplemental Authority on April 16, 2025, requesting that this Court overrule UTC’s objections to Judge Fallon’s January 28, 2025 Order and deny UTC’s motion to strike. *See D.I. 293.*

7. With respect to ¶ 4 of UTC’s Revised Statement of Additional Matters, Judge Fallon’s March 28, 2025 Order (D.I. 274) only permits UTC to “submit a 5 page supplemental report of Dr. Nathan, or one of UTC’s other experts, applying the testimony to UTC’s rebuttal positions.” D.I. 270 at 3. Accordingly, it is Liquidia’s understanding that on May 23, 2025, UTC may only submit one 5-page supplemental expert report that incorporates Dr. Rajan Saggar’s supplemental deposition testimony.

IV. Response to UTC’s Pending FRCP 72(a) Objections

8. As explained above, Liquidia responds to ¶ 1 of UTC’s Revised Statement of Additional Matters by noting that UTC chose not to reopen the depositions of Dr. Victor Tapson, Kevin Laliberte, Michael Wade, and Kiernan DeAngelis. *See D.I. 293-1.* Accordingly, Liquidia filed a Notice of Supplemental Authority on April 16, 2025, in support of Liquidia’s request that this Court overrule UTC’s objections to Judge Fallon’s January 28, 2025 Order and deny UTC’s motion to strike. *See D.I. 293.*

V. Response to UTC’s Reservation of Rights Regarding Damages

9. With respect to ¶¶ 14-20 of UTC’s Revised Statement of Additional Matters, Liquidia confirms that there has been no commercial launch of its proposed product. Further,

throughout fact discovery, UTC took the position that it is entitled to discovery regarding damages and to submit an expert report on the issue of damages. On November 4, 2024, UTC moved to compel Liquidia's production of financial projections "as being relevant when it comes to calculating a reasonable royalty." D.I. 180 at 3. Liquidia submitted its letter brief in opposition on November 5, 2024, arguing that the financial projections were irrelevant to commercial success or infringement, and that damages are statutorily prohibited in this Hatch-Waxman case. D.I. 184. On November 12, 2024, Judge Fallon entered an order that granted-in-part UTC's motion to compel, but limited Liquidia's production of documents to "sales projections and market forecasts relating to PH-ILD" and "produce a witness to testify on the responsive documents." D.I. 193 at 6. Pursuant to Judge Fallon's Order, Liquidia produced information regarding projected sales and market forecasts of Yutrepia and offered as a Rule 30(b)(6) witness, Liquidia's COO and CFO, Michael Kasetta, for deposition on November 22, 2024. On November 20, 2024, UTC notified Liquidia that it was unilaterally refusing to move forward with Mr. Kasetta's 30(b)(6) deposition until after November 26, 2024. Since then, UTC has not sought to reschedule Mr. Kasetta's 30(b)(6) deposition, or seek further recourse from the Court that Liquidia's production was deficient or non-compliant with Judge Fallon's Order. Further, UTC never filed an expert report on the issue of damages, including a reasonable royalty. As such, UTC has waived its right to seek damages in this pending case.

VI. Response to UTC's Revised Statement Regarding Inequitable Conduct Evidence

10. With respect to ¶ 7 of UTC's Revised Statement of Additional Matters, UTC has not requested a jury and has not sought to amend its pleadings to request a jury. The time to amend pleadings has long passed. Thus, UTC is not entitled to a jury in this pending case. Nonetheless, Liquidia responds that evidence should not be shielded from a potential jury if that evidence is relevant to more than one issue such as invalidity, non-infringement and/or inequitable conduct.

VII. Response to UTC's Recommendation of Truncating the Trial to Two Days

11. Liquidia disagrees with UTC's proposal in ¶¶ 11-13 of UTC's Revised Statement of Additional Matters, and asserts that the current three day trial schedule set by the operative March 15, 2024 scheduling order should be maintained. D.I. 45.

12. Although the case now involves only one patent and one independent claim, there would not be sufficient time in a two-day trial to present all the witness testimony the parties need to establish their claims or defenses. UTC has asserted 17 claims covering different subject matter. Further, UTC has disclosed that it may call a total of 30 witnesses to present testimony, live or by deposition at trial, including four experts. Liquidia has disclosed that it may call on a total of 26 witnesses to present testimony live or by deposition at trial, including Liquidia's four experts, two of which offer rebuttal testimony to UTC's experts. It would be highly unlikely for the parties to be able to fit the direct and cross-examination of 8 experts covering 17 claims, let alone fact witnesses, in a two-day trial as UTC suggests, and doing so would prejudice Liquidia. Despite the Court's May 21, 2025 Oral Order requiring the parties to reduce their asserted claims and defenses, UTC still has multiple experts, including 2 on infringement, and a total of 30 witnesses. Furthermore, by maintaining claim 14 of the '327 patent, UTC asserts 7 claims, not 6, as the limitations of claim 11 will additionally need to be met for infringement. The disparate subject matter of the claims still asserted does not narrow the issues for trial and still necessitates three days of trial time.

13. Liquidia agrees with UTC that the parties should aim to conserve judicial resources and encourage efficient presentations by the parties, but shortening the trial in this case to just two days would not be appropriately tailored to the issues to be presented at trial. The appropriate course of action would be for UTC to materially reduce the number of asserted claims and associated subject matter, which would permit Liquidia to reduced the evidence it needs to proffer

to address these disparate claims.

EXHIBIT 15

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS
CORPORATION,

Plaintiff,

v.

LIQUIDIA TECHNOLOGIES, INC.,

Defendant.

C.A. No. 23-00975-RGA-SRF

EXHIBIT 15: COPIES OF PLAINTIFF'S EXPERT'S CVs

CURRICULUM VITAE

STEVEN D. NATHAN, M.D.

Updated 12/02/2024

8

PERSONAL INFORMATION:

BUSINESS ADDRESS:

Inova Heart and Vascular Institute
Inova Fairfax Medical Campus
3300 Gallows Road
Falls Church, VA 22042-3300
Tel: (703) 776-3610
Fax: (703) 776-3515
steven.nathan@inova.org

PLACE OF BIRTH:

South Africa

MARITAL STATUS

Married – 2 children

VISA STATUS

US Citizen

LICENSURE:

1994-active
1988-1994
Virginia
California

OTHER CERTIFICATION:

1984 FMGEMS
1983 Certificate of full registration as Medical Practitioner of General Medical Council, London, U.K.

BOARD CERTIFICATION:

2020 Recertified in Pulmonary Diseases
2011 Recertified in Critical Care Medicine
2010 Recertified in Pulmonary Diseases
2000 Recertified in Pulmonary Diseases and Critical Care Medicine
1991 American Board of Critical Care Medicine
1990 American Board of Pulmonary Diseases
1988 American Board of Internal Medicine

EDUCATION:

1976-1981 M.B.B.cH University of the Witwatersrand Medical School,
Johannesburg, South Africa
1971-1975 Matriculation, Parktown Boys High School, Johannesburg, South Africa.
Distinctions in Mathematics, Science and Latin.

POSTGRADUATE EDUCATION:

1991-1992	Fellow, Lung Transplantation, Cedars-Sinai Medical Center, Los Angeles, CA
1988-1991	Fellow, Pulmonary Medicine and Critical Care, Cedars-Sinai Medical Center, Los Angeles, CA.
1985-1988	Internal Medicine Residency, Long Island Jewish Hospital, New York City, NY
1983-1985	South African Defense Force, Medical Corps
1982	Internship: six months Internal Medicine & six months General Surgery Johannesburg Hospital, South Africa.

PROFESSIONAL APPOINTMENT:

May 2020- active	Professor of Medical Education, University of Virginia
May 2018-inactive	Medical Director, Pulmonary Service Line, Inova Fairfax Hospital
July 2011-active	Professor of Medicine, Virginia Commonwealth University
May 2008-June 2011	Associate Professor of Medicine, Virginia Commonwealth University
September 2007-	Co-Director, NIH-Inova Advanced Lung Disease Program
January 2006-inactive	Affiliate Professor of Biomedical Science George Mason University
November 2004-May 06	Interim Medical Director, Heart Transplant Program
September 2004-active	Medical Director, Advanced Lung Disease Program Inova Fairfax Hospital
January 1998	Director of Thoracic Immunology Inova Fairfax Hospital
March 1997-inactive	Clinical Assistant Professor Georgetown University Medical Center
September 1996-active	Medical Director Lung& Heart-lung Transplantation, Inova Fairfax Hospital Falls Church, VA
April 1994-August 96	Medical Director, Lung Transplantation McGuire VA Medical Center, Richmond, VA
April 1994-August 96	Staff Physician, Pulmonary Medicine/Internal medicine McGuire VA Medical Center, Richmond, VA
Sep 1994-August 96	Assistant Professor, Department of Medicine, Medical College of Virginia, Richmond, VA
July 1992-March 94	Associate Medical Director, Lung Transplantation Cedars-Sinai Medical Center
July 1992-March 94	Staff Physician, Pulmonary Medicine/Internal Medicine Cedars-Sinai Medical Center

HONORS AND AWARDS:

CHEST 2023 College Medalist Award recipient- awarded at the annual ACCP meeting, Honolulu October 8th, 2023.

Winner of the Outstanding Clinician of the Year. December 2010 Metropolitan DC Thoracic Society

Winner of the Alfred Soffer Research award for presentation at CHEST 2009: High Resolution

Computed Axial Tomography of the Chest for the Detection of Coronary Artery Disease in Patients With Idiopathic Pulmonary Fibrosis. November 2009

Basavaraj A, Barnett SD, Kiernan J, Shlobin OA, Ahmad S, **Nathan SD**. Prevalence of Unsuspected Coronary Artery Disease in Patients with Idiopathic Pulmonary Fibrosis. Best clinical research poster Washington DC Thoracic Society meeting, April 2009.

M Chhina, MC Embлом-Callahan, GM Grant, **SD Nathan**: Beta-actin protein over-expression in IPF pulmonary myofibroblasts *in vivo*. Best basic research poster Washington DC Thoracic Society meeting, April 2009.

American Lung Association of Virginia's 2008 Douglas Southall Freeman Award for outstanding leadership in lung transplantation

Certificate of appreciation in recognition of outstanding skill and dedication in teaching Pulmonary and Critical Care Fellows 2004. Department of Medicine, Walter Reed Army Medical Center.

Young investigator award, American College of Chest Physicians 2001. Kelly WF, **Nathan S**, Sanghani S, Burton N. Significance or Early Bronchoscopic Airway Abnormalities after Lung Transplantation.

Letter of commendation from Chest for being in the top 10% of manuscript reviewers. March 2002.

Senior Citizens Counseling and Delivery Service and Medical Society of D.C. Winner of the 20th Annual "It's Great to be Alive" Senior Essay Contest for Outstanding Professionalism and Exemplary Care and Commitment to Senior Citizens. May 31st 2002

University of the Witwatersrand 75th Jubilee medal award for distinguished achievements -1997.

Young investigators award, Southern California research conference 1993. Ishaaya A, **Nathan S**, Belman M: Work of Breathing in the Immediate Post Extubation Period.

November 9th, 2021. 2021 NHLBI Director's Award in the COVID-19 Response category

PROFESSIONAL SOCIETIES:

Professional Activities:

Washington DC Thoracic Society, Member

American Thoracic Society, Member

Fellow of the American College of Chest Physicians

International Society for Heart and Lung Transplantation, Member

Pulmonary Council Member, International Society for Heart and Lung Transplantation

Pulmonary Vascular Research Institute, Fellow-2011

European Respiratory Society, member

Committees:

March 11 th , 2024	Member of the Board, Gossamer Bio
October 2023-	Steering committee member; inhaled pirfenidone study in PPF, Avalyn Pharma

May 2023-	Data monitoring committee, BMS phase 3 study of BMS-986278
May 2023-March 2024	Chair, Steering committee for Roivant PH-ILD study
April 2023-March 2024	Steering committee for TPIP study (Insmed)
February 2023-	Steering committee, Tvardi IPF study
November 2022-	Consultant to the Anesthesiology and Respiratory Therapy Devices and to the Center for Devices and Radiological Health, FDA
Nov 2022-March 2024	Member, Scientific Advisory Committee, Merck study of MK-5475-013 Study in PH-COPD. INSIGNIA study
November 1 st , 2022	Chair, FDA Advisory Board meeting, Review of Pulse Oximeters and Factors that can Impact their Accuracy
September 2021-	Member, Observational Safety Monitoring Board for thePhysical Activity in Pulmonary Hypertension Study (ACTiPH)
June 2021-	Member, DMC, HZNP-HZN-825-301 study. A Randomized, Double-blind, Placebo-controlled, Repeat-dose, Multicenter Trial to Evaluate the Efficacy, Safety, Tolerability, Pharmacokinetics of HZN-825 in Patients with Diffuse Cutaneous Systemic Sclerosis. Horizon Therapeutics.
April 2021-2022	Study Chair: Multicenter, Phase I – II Clinical Study of The Selective Bromodomain and Extraterminal (BET) inhibitor TG-1601 for the Treatment of COVID-19 in Hospitalized Adults. TC Therapeutics
December 2020-2022	Chair DSMB, Protocol BGB-DXP593-102, BeiGene
July 2020-March 2024	Steering committee member for STARSCAPE Study of PRM-151 study in IPF, Roche
April 2020-	Chair Steering committee for the TETON study (inhaled Treprostinil for IPF), United Therapeutics
September 2019-	DSMB for study-GKT137831-IPF. A Randomized, Double-Blind, Placebo Controlled Phase II Clinical Trial of GKT137831 in Patients with Idiopathic Pulmonary Fibrosis
June 2019-2022	Adjudication committee ISABELA studies of GLPG1690 for IPF, Galapagos
October 2018-	Adjudication committee, study of anastrozole in subjects with PAH (HL134905, NCT03229499) (PHANTOM Study).
June 2018-	Chair, DSMB for DHEA in PAH
2018 June 14 th	Chair, FDA Advisory Panel, Anesthesiology and Respiratory Therapy Devices Panel Meeting: PneumRx, Inc. ELEVAIR Endobronchial Coil System
2018 Feb-Mar	Co-Chair World Symposium on Pulmonary Hypertension Lung Disease Task Force
2017 June-present	Chair, Steering Committee for study of inhaled ambulatory Nitric Oxide in patients with PH-ILD (Bellerophon)
2017-2019	PHAR Liaison Committee
2017 May 17 th	Member, FDA Advisory Panel for Transmedics Organ Care System. Gastroenterology and Urology Devices Panel
2016-2021	Steering committee member. A phase IIB study of Sildenafil added to Pirfenidone in advanced IPF and intermediate or high probability of group 3 PH. (Roche-MA29957)
2016-	Steering committee member for RIN-PH-201 (INCREASE Study) Safety and Efficacy of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Parenchymal Lung Disease
2016-2019	Steering Committee member, Pulmonary Fibrosis Foundation Registry

2016-	Steering committee member for RIN-PH-203 study (Safety and Tolerability of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Chronic Obstructive Pulmonary Disease)
2016-2017	ATS Nominating Committee for Clinical Problems Assembly.
2016, March 31st	External Advisory Board member COPD/ILD PPG: NIH NHLBI P01HL11450
2016-2019	Clinical representative to the Care Center Network and Patient Registry Steering Committee, Pulmonary Fibrosis Foundation.
2014-2019	Biospecimen Use Committee, Inova Fairfax Hospital
2014-2019	Executive Research Oversight Committee, Inova Fairfax Hospital
2014-active	Chair, FDA Anesthesiology and Respiratory Therapy Devices Panel
2014, March 20 th	Member, FDA Advisory Panel for XVIVO Perfusion System, Gastroenterology and Urology Devices Panel.
2014-active	Chair, Steering Committee for Pilot initiative (Pulmonary Fibrosis Identification: Lessons for Optimizing Treatment)
2014, February 20 th	Chair, FDA Advisory meeting for the Inspire II Upper Airway Stimulator
2013-2019	Chair, Steering Committee for RISE-IIP study of Riociguat.
2013-2014	Chair, Promotions Committee, Inova Fairfax campus of VCU
2013-2016	Virginia Commonwealth University-Inova Fairfax campus promotions committee.
2013-2014	Consultant, Anesthesiology and Respiratory Therapy Devices Panel of the Medical Devices Advisory Committee, Center for Devices and Radiological Health, FDA
2012-2015	ATS Pulmonary Circulation Assembly Program Committee
2012-2016	Chairperson, Inova Pulmonary and Critical Care Task Force.
2011-2013	Adjudication committee :Imatinib in Pediatric PAH Novartis study CQTI571A2306:
2011-2013	Adjudication Committee of nilotinib in PAH patients (study CAMN107X2201)
2011-active	Steering Committee member, www.theheart.org , Pulmonary Hypertension Medscape PAH Advisory Board
2011-active	Member, Steering Committee, Riociguat for COPD-PH study,
2011-2012	Member, Steering Committee, ASCEND study of Pirfenidone for IPF
2011-2014	Chairperson, Finance and Investment Committee, Washington Regional Transplant Community
2011-2012	Member, Steering Committee for CME program “Comprehensive PAH Management”
2010-2017	Faculty member for Interstitial lung diseases, Faculty of 1000.
2010-2011	Committee member GMU, Masters Degree John Grimsley & Steven Longstreet
2009-2011	Member Steering Committee, Artemis-IPF
2009-active	Adjudication Committee for Novartis study of Tasigna in PAH.
2009-2012	Medscape Transplantation Advisory Board
2009-2013	Adjudication Committee for IMPRES Study (Novartis).
2009-2010	Specialist advisor for British Medical Journal Action Sets.
2009-2011	Chair, Steering Committee, Artemis-PH study
2008-2009	Search Committee member, Chief Pulmonary-Vascular Medicine Branch, National Institute of Health
2008-2010	Committee member, Doctoral Degree committee (GMU) for Mantej Chhina

& Margaret Emblom-Callahan
2007-active Honor Code Faculty Advisor, Virginia Commonwealth University, Inova Fairfax Campus
2006-2013 Member, Data Safety Monitoring Board for the NIH sponsored IPF Clinical Resource Network
2005-active Pulmonary Editorial Board, Medscape
2004-2010 Steering Committee member for Pilot initiative (Pulmonary Fibrosis Identification: Lessons for Optimizing Treatment)
2004-2008 American College of Chest Physicians abstract reviewer
2003-2007 American College of Chest Physicians Network Interstitial Lung Disease Steering Committee
2003-active Inova Health System IRB Executive Committee
2000-2013 Annual Inova Pulmonary & Critical Care Conference, co-course Director
2001-2003 Graduate Medical Education Committee, Inova Fairfax Hospital
1998-1999 American Thoracic Society International Conference Clinical Program Organizing Committee
1994 - 1996 Member, Infection Control Committee,
McGuire VA Medical Center
1994- 1998 Member of Lung Transplant Research Database Group
1989-1992 Fellow Representative, Pulmonary Advisory Committee and Pulmonary RAPP Committee. Cedars-Sinai Medical Center

Reviewer:

BMC Pulmonary Medicine
Journal of Medical Economics
Lancet Respiratory
JAMA
American Journal of Transplantation
American Review of Respiratory and Critical Care Medicine
Annals of Internal Medicine
Arthritis and Rheumatism
Chest
European Respiratory Journal
Expert Opinion on Biological Therapy
Expert Opinion on Emerging Drugs
Gene Therapy & Molecular Biology
Journal of Intensive Care Medicine
Progress in Transplantation
Respiration
The Journal of Heart and Lung Transplantation
The Journal of Rheumatology
Thorax
BMJ Point of Care
Future Cardiology
Respirology
International Journal of COPD
Respiratory Research
Clinical Transplantation
Lung

Contemporary Clinical Trials
Acta Cardiologica
Clinical Investigation
Proceedings of the American Thoracic Society
Cochrane Review
Clinical Medicine Insights: Circulatory, Respiratory and Pulmonary Medicine
New England Journal of Medicine

Editorial Boards:

2015- active Editorial Board member, Thorax
2014- 2015 Editorial Board, Annals ATS
2013- 2015 Associate Editor, Thorax
1999- active Editorial Board, Progress in Transplantation

PUBLIC SERVICE:

2011-2013	Chair of the Finance Committee, Washington Regional Transplant Community
1997-2001	Member, Fairfax County Commission on Organ and Tissue Donation and Transplantation
2002-2018	Board Member, Washington Regional Transplant Community

Extracurricular Achievements:

1996	Marine Corps Marathon
1989	Los Angeles Marathon
1987	New York Marathon
1985	Johannesburg Marathon
1978/79	Swimming - South African International Swim Team
1979	South African 200 meters Freestyle/100 meters Butterfly runner-up
1978	South African 100 meters Freestyle Champion
1978	Provincial Team Swimming Captain
1975	High School Provincial Team Swimming Captain

Scholarship and Research: (Google H-index: 73 Date: 09/13/2024)

PUBLISHED RESEARCH PAPERS:

1. **Nathan SD**, Ishaaya A, Koerner SK, Belman M: Prediction of Minimal Pressure Support during Weaning from Mechanical Ventilation. Chest 1993; 103:1215-1219
2. Ross DJ, Vassollo M, Kass R, Koerner SK, Siegel R, **Nathan SD**, Waters P, Maurer G: Transesophageal Echocardiographic (TEE) Assessment of Pulmonary Venous Flow after Single Lung Transplantation. Journal of Heart and Lung Transplantation 1993; 12:689-694
3. **Nathan SD**, Ross DJ, Zakowski P, Kass RM, Koerner SK; Utility of Inhaled Pentamidine Prophylaxis in Lung Transplant Recipients. Chest 1994; 105:417-420
4. Ishaaya A, **Nathan SD**, Belman MJ: Work of Breathing in the Immediate Post Extubation Period. Chest 1995; 107:204-209

5. Ross DJ, Belman MJ, Mohsenifar Z, **Nathan SD**, Kass RM, Koerner SK: Obstructive Flow-Volume Loop Contours after Single Lung Transplantation. *Journal of Heart and Lung Transplantation* 1994; 13:508-513
6. Belman MJ, Botnick WC, **Nathan SD**, Chon K: Ventilatory Load Characteristics During Ventilatory Muscle Training. *Am J Respir Crit Care Med* 1994; 149:925-929.
7. Ross DJ, Yeh A, **Nathan SD**, Toyoda M, Marchevski A, Kass RM, Koerner SK, Jordan SC. Differential SIL-2R levels in Bilateral Bronchoalveolar Lavage after Single Lung Transplantation. *Journal of Heart and Lung Transplantation* 1994;13:972-9
8. **Nathan SD**, Ross DJ, Belman MJ, Shain S, Elaashoff JD, Kass RM, Koerner SK. Bronchiolitis Obliterans in Single Lung Transplant Recipients. *Chest* 1995; 107:967-72.
9. Ross DJ, Jordan SC, **Nathan SD**, Kass RM, Koerner SK. Delayed Development of Obliterative Bronchiolitis Syndrome with OKT3 after Unilateral Lung Transplantation; a Plea for Multicenter Immunosuppressive Trials. *Chest* 1996; 109: 970-973
10. **Nathan SD**, Shorr A, Schmidt ME, Burton NA. Aspergillus and Endobronchial Problems in Lung Transplant Recipients. *Chest* 2000;118:403-407
11. Shorr AF, Davies D, **Nathan SD**. Outcomes for Patients with Sarcoidosis awaiting Lung Transplantation. *Chest* 2002;122:233-238
12. **Nathan SD**, Barnett SD, Burton NB. Bronchiolitis Obliterans Syndrome: Utility of the New Guidelines in Single Lung Transplant Recipients. *J Heart Lung Transplant* 2003;22:427-432
13. Shorr AF, Davies DB, **Nathan SD**. Predicting Mortality in Patients with Sarcoidosis awaiting Lung Transplantation. *Chest* 2003;124:922-028
14. Kelly WF, **Nathan S**, Sanghani S, Barnett SD, Burton N. Significance of early Bronchoscopy Airway Abnormalities after Lung Transplantation. *J Heart Lung Transplant* 2003;22:583-586
15. **Nathan SD**, Barnett SD, Nowalk C, Moran B, Burton N. Pulmonary Emboli in IPF Transplant Recipients. *Chest* 2003;123:1758-1763
16. **Nathan SD**, Barnett SD, Moran B, Helman D, Johnson K, Ahmad S, Shorr A. Interferon gamma1-b as therapy for Idiopathic Pulmonary Fibrosis: an Intrapatient Analysis. *Respiration* 2004;71:77-82
17. Shorr AF, Helman DL, Davies DB, **Nathan SD**. Sarcoidosis, Race and Short-term Outcomes Following Lung Transplantation. *Chest* 2004;125:990-996
18. **Nathan SD**, Barnett SD, Ahmad S, Harrison J, Shorr AF, Lefrak EA, Burton NB. Mortality from Time of Listing for Transplant as an Indicator of Candidate Outcomes. *Progress in Transplantation* 2004;14:29-32

19. **Nathan SD**, Edwards LB, Barnett SD, Ahmad S, Burton NB. Outcomes of COPD Transplant Recipient's Post-Lung Volume Reduction Surgery. *Chest* 2004;126:1569-1574
20. Shah NR, Noble P, Jackson R, King T, **Nathan S**, Padilla M, Raghu G, Rhodes M, Schwarz M, Tino G, Dubois RW. A Critical Assessment of Treatment Options for Idiopathic Pulmonary Fibrosis. *Sarcoidosis Vasc Diffuse Lung Dis* 2005;22:167-174
21. Shorr AF, **Helman DL**, Davies DB, **Nathan SD**. Pulmonary Hypertension in Advanced Sarcoidosis: Epidemiology and Clinical Characteristics. *European Respiratory Journal*. May 2005 25(5):783-8
22. Lettieri CJ, Browning RF, Shorr AF, Ahmad S, **Nathan SD**. The Distance Saturation Product: A Novel Measure for Mortality Prediction in Idiopathic Pulmonary Fibrosis. *Respiratory Medicine* 2006;100:1734-1741
23. Lettieri CJ, **Nathan SD**, Barnett S, Ahmad S, Shorr AF. Prevalence and Outcomes of Pulmonary Arterial Hypertension in Idiopathic Pulmonary Fibrosis. *Chest* 2006;129: 746-752
24. Orens, JB, Estenne M, Arcasoy S, Conte JV, Corris P, Egan JJ, Egan T, Keshavjee S, Knoop C, Kotloff R, Martinez FJ, **Nathan S**, Palmer S, Patterson A, Singer L, Snell G, Studer S, Vachiery JL, Glanville AR. International Guidelines for the Selection of Lung Transplant Candidates:2006 Update-A Consensus Report From the Pulmonary Scientific Council of the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant* 2006;25:745-755
25. **Nathan SD**, Shlobin OA, Ahmad S, Urbanek S, Barnett SD. Pulmonary Hypertension and Pulmonary Function Testing in Idiopathic Pulmonary Fibrosis. *Chest* 2007;131:657-663
26. Shorr AF, Wainright JL, Cors CS, Letteri CJ, **Nathan SD**. Pulmonary Hypertension In Patients with Pulmonary Fibrosis Awaiting Transplant. *Eur Respir J* 2007;30:715-721
27. **Nathan SD**, Shlobin OA, Ahmad S, Kraus T, Koch J, Barnett SD, Ad N, Burton N, Leslie K. Serial Development of Pulmonary Hypertension in Patients with Advanced Idiopathic Pulmonary Fibrosis. *Respiration* 2008;76:288-294
28. Zisman DA, Karlamangla AS, Kawut SM, Shlobin OA, Saggar R, Schwarz MI, Belperio JA, Lynch JP, **Nathan SD**. Validation of a Prediction Method to Estimate the Presence of Pulmonary Hypertension in Advanced Idiopathic Pulmonary Fibrosis. *Chest* 2008;133:633-639.
29. **Nathan SD**, Shlobin OA, Ahmad S, Barnett SD, Burton NA, Gladwin M, Machado R. Pulmonary Hypertension in Patients with Bronchiolitis Obliterans Post-Lung Transplantation. *Am J Transplant* 2008;8:1-6
30. **Nathan SD**, Barnett SD, Saggar R, Belperio JA, Shlobin OA, Ross DJ, Ahmad S, Saggar R, Libre E, Hourigan S, Lynch JP, Zisman DA. Right ventricular systolic pressure by echocardiography as a predictor of Pulmonary Hypertension in patients with idiopathic pulmonary fibrosis. *Respir Med* 2008;102:1305-1310

31. Barnett CF, Bonura EJ, **Nathan SD**, Ahmad S, Shlobin O, Osei K, Zaiman AL, Hassoun PM, Moller DR, Barnett SD, Girgis RE. The Treatment of sarcoidosis associated pulmonary hypertension: a two center experience. *Chest* 2009;135:1455-1461
32. El-Chemaly S, Malide D, Zudaire E, Ikeda Y, Weinberg B, Pacheco-Rodriguez G, Rosas I, MacDonald SD, Wu H, **Nathan SD**, Cutitta F, McCoy JP, Gochuico BR, Moss J. Abnormal Lymphangiogenesis in Idiopathic Pulmonary Fibrosis: Insights into Cellular and Molecular Mechanisms. *PNAS* 2009 <http://www.pnas.org/content/early/2009/02/20/0813368106.abstract>
33. King CS, Khandhar S, Burton N, Shlobin OA, Ahmad S, Barnett SD, **Nathan SD**. Native Lung Complications In Single Lung Transplant Recipients And the Role of Pneumonectomy. *J Heart Lung Transplant* 2009;28:851-6
34. **Nathan SD**, Shlobin OA, Reese E, Ahmad S, Fregoso M, Athale C, Barnett SD. The Prognostic Value of the Six-minute Walk Test in Patients with Bronchiolitis Obliterans Syndrome. *Respiratory Medicine* 2009;103:1816-21.
35. Minai OA, **Nathan SD**, Hill NS, Badesch DB, Stoller JK. Pulmonary Hypertension in Lung Diseases: Survey of Beliefs and Practice Patterns. *Res Med* 2010;104:741-748
36. Emblom-Callahan MC, Chhina M, Shlobin OA, Ahmad S, Reese E, Brenner R, Burton NB, Grant G, **Nathan SD**. Genomic Phenotype of Non-Cultured Pulmonary Myofibroblasts in Idiopathic Pulmonary Fibrosis. *Genomics* 2010;96:134-145
37. **Nathan SD**, Shlobin OA, Ahmad S, Burton NA, Barnett SD. Waiting times for IPF patients listed for bilateral or single lung transplantation only. *J Heart Lung Transplant* 2010;29:1165-1171
38. Woodrow JP, Shlobin OA, Barnett SD, **Nathan SD**. Prognosis Associated with Bronchiolitis Obliterans Syndrome Compared to Other Forms of Chronic Allograft Dysfunction Complicating Lung Transplantation. *J Heart Lung Transplant* 2010;29:1159-1164
39. **Nathan SD**, Basavaraj A, Reichner C, Shlobin OA, Ahmad S, Kiernan J, Burton N, Barnett SD. Prevalence and impact of coronary artery disease in Idiopathic Pulmonary Fibrosis. *Res Med* 2010;104:1035-1041
40. Cuttica MJ, Kalhan R, Shlobin OA, Ahmad S, Gladwin M, Machado RF, **Nathan SD**. Functional Impact of Pulmonary Hypertension in Patients with COPD Listed for Lung Transplant. *Res Med* 2010;104:1877-1882
41. **Nathan SD**, Shlobin OA, Urban, BA, Curry CA, Basavaraj A, Ahmad S, Weir N, Kiernan J, Sheridan MJ, Earls J. CAT scanning for the Detection of Coronary Artery Disease in patients with IPF. *Respirology* 2011;16:481-486
42. Eberlein M, Permutt S, Brown RH, Brooker A, Chahla MF, Bolukbas S, Mason DP, **Nathan SD**, Orens JB, Brower RG. Supranormal Expiratory Airflow after Bilateral Lung Transplantation is Associated with Improved Survival. *Am J Respir Crit Care Med* 2011;183:79-87

43. Swigris JJ, Olson A, Shlobin OA, Ahmad S, Brown KK, **Nathan SD**. Heart Rate Recovery after 6MWT Predicts Pulmonary Hypertension in Patients with IPF. *Respirology* 2011;16:439-445
44. Xue J, Gochuico B, Alawad A, Feghali-Bostwick C, Noth I, **Nathan SD**, Rosen G, Rosas I, Dacic S, Ocak I, Fuhrman C, Cuenco K, Smith M, Jacobs S, Zeevi A, Morel P, Pilewski J, Valentine V, Gibson KF, Kaminski N, Sciurba S, Zhang Y, Duncan S. The HLA Class II Allele DRB1*15 is over-represented in patients with Idiopathic Pulmonary Fibrosis. *PLoS ONE* 2011 Feb 23;6(2):e14715
45. **Nathan SD**, Shlobin OA, Weir N, Ahmad S, Kaldjob JM, Battle E, Sheridan MJ, du Bois RM. Long-term Course and Prognosis of Idiopathic Pulmonary Fibrosis in the Modern Era. *Chest* 2011;140:221-229.
46. Kamal K, Mubarak, Ana Montes-Worboys, Doron Regev, Nasreen Najmunnisa, Kamal A. Mohammed, Ibrahim Faruqi, Edward Hensel, Maher A. Baz, Olufemi A. Akindipe, Sebastian Fernandez-Bussy, **Nathan SD**, Antony VB. Parenchymal trafficking of pleural mesothelial cells in idiopathic pulmonary fibrosis: Potential role in pathogenesis. *Eur Respir J* 2012;39:133-140
47. Eberlein M, Reed RM, Permutt S, Chahla MF, Bolukbas S, **Nathan SD**, Iacono A, Pearse DB, Fessler HE, Orens JB, Brower RG. Parameters of donor-recipient mismatch and survival after bilateral lung transplantation. *J Heart Lung Transplant* (July 28th, 2011). Oct 28. [Epub ahead of print] PMID: 22036314
48. Eberlein M, Permutt S, Chahla MF, Bolukbas S, **Nathan SD**, Shlobin OA, Shelhamer JH, Reed RM, Pearse DB, Fessler HE, Orens JB, Brower RG. Lung Size Mismatch in Bilateral Lung Transplantation Is Associated With Allograft Function and Bronchiolitis Obliterans Syndrome. *Chest* 2012;141:451-460
49. Brown AW, Shlobin OA, Weir N, Albano MC, Ahmad S, Smith M, Leslie K, **Nathan SD**. Dynamic patient counseling: A novel concept in idiopathic pulmonary fibrosis. *Chest* 2012;142:1005-1010
50. Shlobin OA, Weir N, Brown AW, Ahmad S, Brown K, Lemma M, **Nathan SD**. Transition of Pulmonary Hypertension Patients from Sildenafil to Tadalafil: Feasibility and Practical Considerations. *Lung*. 2012;190:573-578.
51. Kottman RM, Kulkarni AA, Smolnycki KA, Lyda E, Dahanayake T, Salibi R, Honnons S, Jones C, Isern NG, Hu JZ, **Nathan SD**, Grant GG, Phipps RP, Sime PJ. Lactic acid is elevated in IPF and induces myofibroblast differentiation via pH dependent activation of TGF-beta. *Am J Respir Crit Care Med* 2012;186:740-751
52. Chan L, Chin LMK, Kennedy M, Woolstenhulme J, **Nathan SD**, Weinstein A, Connors G, Weir N, Drinkard B, Lamberti J, Keyser R. Improved Six-Minute Walk Distance and Quality of Life in Patients with Pulmonary Hypertension Following Intensive Treadmill Exercise Training. *Chest* 2013;143:333-343.

53. El-Chemaly S, Malide D, Yao J, **Nathan SD**, Rosas IO, Gahl WA, Moss J, Gochuico BR. Glucose transporter-1 (Glut-1) Distribution in Fibrotic Lung Disease: Association with FDG-PET Uptake Inflammation, and Neovascularization. *Chest* 2013;143:1685-91

54. **Nathan SD**, Reffett T, Brown AW, Fischer CP, Shlobin OA, Ahmad S, Weir N, Sheridan MJ. ScD- The Red Cell Distribution Width as a Prognostic Indicator in IPF. *Chest* 2013;143:1692-98

55. Raghu G, Behr J, Brown KK, Egan JJ, Kawut SM, Flaherty KR, Martinez FJ, **Nathan SD**, Wells AU, Collard HR, Costabel U, Richeldi L, Andrade J, Noble P, Cottin V, DeMarco T, Davis C, Khalil N, Morrison LE, Lederer D, Shao L, Pedersen PS, Montgomery AB, Chien JW, O'Riordan TG. Artemis-IPF: Treatment of Idiopathic Pulmonary Fibrosis with Ambrisentan, a Selective Antagonist of the Endothelin A Receptor: A randomized trial. *Ann Int Med* 2013;158:641-9

56. Weinstein AA, Kennedy M, Keyser RE, **Nathan SD**, Chin LMK, Woolstenhulme J, Connors G, Chan L. Effect of Aerobic Exercise Training on Fatigue and Physical Activity in Patients with Pulmonary Hypertension. *Respir Med*. 2013;107:778-84

57. Weir NA, Brown AW, Shlobin OA, Smith MA, Reffett T, Battle E, Ahmad S, **Nathan SD**. The Influence of Alternative Instruction on the Six Minute Walk Test Distance. *Chest* 2013;144:1900-1905

58. King Jr TE, Albera C, Bradford WZ, Costabel U, du Bois RM, Leff JA, **Nathan SD**, Sahn SA, Valeyre D, Noble PW. All-cause Mortality Rate in Patients with Idiopathic Pulmonary Fibrosis: Implications for the Design and Execution of Clinical Trials. *Am J Respir Crit Care Med* 2014;189:825-831

59. Cullinane AR, Yeager C, Dorward H, Carmona-Rivera C, Wu HP, Moss J, O'Brien KJ, **Nathan SD**, Meyer KC, Rosas IO, Helip-Wooley A, Markello TC, Huizing M, Gahl WA, Gochuico BR. BLOC-3 Regulation of Galectin-3: Implications for Hermansky-Pudlak Syndrome Pulmonary Fibrosis. *American Journal of Respiratory Cell and Molecular Biology* 2014;50:605-613

60. King TE, Bradford WZ, Castro-Bernardini S, Fagan EA, Glaspole I, Glassberg MK, Gorina E, Hopkins PM, Kardatzke D, Lancaster L, Lederer D, **Nathan SD**, Pereira CA, Sahn SA, Sussman R, Swigris JJ, Noble PW. The ASCEND Trial: A randomized, double-blind, placebo controlled trial of pirfenidone in patients with idiopathic pulmonary fibrosis. *N Engl J Med* 2014;370:2083-2092

61. Shin S, King CS, Brown AW, Albano MC, Atkins M, Sheridan M, Ahmad S, Newton K, Weir N, Shlobin OA, **Nathan SD**. Pulmonary artery size as a predictor of pulmonary hypertension and outcomes in patients with chronic obstructive pulmonary disease. *Respir Med*. 2014 Nov;108(11):1626-32

62. Brown AW, Fischer CP, Shlobin OA, Buhr RG, Ahmad S, Weir NA, **Nathan SD**. Outcomes after Hospitalization in Idiopathic Pulmonary Fibrosis: a cohort study. *Chest* 2015;147: 173 – 179

63. Keyser RE, Woolstenhulme J, Chin L, **Nathan SD**, Connors G, Drinkard B, Lamberti J, Chan L. Cardiorespiratory Function Before and After Aerobic Exercise Training in Patients with Interstitial Lung Disease. *J Cardiopulm Rehabil Prev*. 2015 Jan-Feb;35(1):47-55

64. Keyser RE, Christensen EJ, Chin LMK, Woolstenhulme JG, Drinkard B, Quinn A, Connors G, Weir N, **Nathan SD**, Chan LE. Fatigability after Intense Aerobic Exercise Training Patients with Interstitial Lung Disease. *Res Med* 2015;109:517-525
65. Kirillov V, Siler JT, Ramadass M, Ge L, Grant G, **Nathan SD**, Jarai G, Trujillo G. Sustained Activation of Toll-like Receptor 9 Induces an Invasive Phenotype in Lung Fibroblasts. Possible Implications in Idiopathic Pulmonary Fibrosis. *Am J Pathol*. 2015 Apr;185(4):943-57. doi: 10.1016/j.ajpath.2014.12.011
66. Lederer DJ, Bradford WZ, Fagan EA, Glaspole I, Glassberg MK, Glasscock KF, Kardatzke D, King TE, Lancaster L, **Nathan SD**, Pereira CA, Sahn SA, Swigris JJ, Noble PW. Sensitivity Analyses of the Change in Forced Vital Capacity in a Phase 3 Trial Evaluating Pirfenidone in Adults with Idiopathic Pulmonary Fibrosis. *Chest*. 2015;148:196-201
67. **Nathan SD**, du Bois RM, Albera, C, Bradford WZ, Costabel U, Kartashov A, Noble PW, Sahn SA, Valeyre D, Weycker D, King TE. Validation of test performance characteristics and minimal clinically important difference of the 6-minute walk test in patients with idiopathic pulmonary fibrosis. *Respir Med* 2015;109:914-922
68. Kim SY, Diggans J, Pankratz D, Huang J, Pagan M, Sindy N, Tom E, Anderson J, Choi Y, Lynch DA, Steele M, Flaherty KR, Brown KK, Farah H, Bukstein MJ, Pardo A, Selman M, Wolters P, **Nathan SD**, Colby TV, Myers JL, Katzenstein AA, Raghu G, Kennedy GC. Differentiating Interstitial Lung Diseases Using Machine Learning on High-Dimensional Transcriptional Data and Surgical Lung Biopsies. *Lancet Respir Med*. 2015;3:473-483 doi: 10.1016/S2213-2600(15)00140-X.
69. Raghu G, **Nathan SD**, Behr J, Brown KK, Egan JJ, Kawut SM, Flaherty KR, Martinez FJ, Wells AU, Shao L, Zhang H, Henig N, Szwarcberg J, Gillies H, Montgomery AB, O'Riordan TG. Pulmonary hypertension in idiopathic pulmonary fibrosis with mild to moderate restriction. *Eur Respir J* 2015 46(5):1370-7 doi: 10.1183/13993003.01537-2014.
70. **Esposito DB**, Lanes SF, Donneyong M, Holick CN, Lasky JA, Lederer D, **Nathan SD**, O'Quinn S, Parker J, Tran TN. Idiopathic pulmonary fibrosis in US automated claims: incidence, prevalence and algorithm validation. *Am J Respir Crit Care Med* 2015.192:1200-1207. PMID:26241562
71. Yu YF, Macaulay DS, Reichmann WM, Wu EQ, **Nathan SD**. Association of early suspected acute exacerbations of idiopathic pulmonary fibrosis with subsequent clinical outcomes and healthcare resource utilization. *Respir Med*. 2015 Nov 6. pii: S0954-6111(15)30082-2. doi: 10.1016/j.rmed.2015.11.001
72. Reichmann WM, Yu YF, Macaulay DS, Wu EQ, **Nathan SD**. Change in Forced Vital Capacity and Associated Subsequent Outcomes in Patients with Newly Diagnosed Idiopathic Pulmonary Fibrosis. *BMC Pulm Med*. 2015 Dec 29;15(1):167. doi: 10.1186/s12890-015-0161-5.
73. Noble PW, Albera C, Bradford WZ, Costabel U, du Bois RM, Fagan EA, Fishman RS, Glaspole I, Glassberg MK, Lancaster L, Lederer DJ, Leff JA, **Nathan SD**, Pereira CA, Sahn SA, Swigris JJ, Valeyre D, King TE. Pirfenidone for idiopathic pulmonary fibrosis: Analysis of pooled data from three multinational Phase 3 trials. *Eur Respir J*. 2016 Jan;47(1):243-53. doi: 10.1183/13993003.00026-2015.

74. Crawford EL, Levin A, Safi1 F, Liu M, Baugh A, Zhang X, Yeo J, Khuder SA, Boulos AM, Nana-Sinkam P, Massion P, Arenberg DA, Midthun D, Mazzone PJ, **Nathan SD**, Wainz R, Silvestri G, Tita J, Willey JC. Lung Cancer Risk Test Trial: Study Design, Participant Baseline Characteristics, Safety, and Establishment of Biospecimen Bank. *BMC Pulmonary Medicine* 2016;16:16 DOI 10.1186/s12890-016-0178-4

75. Lancaster L, Albera C, Bradford WZ, Costabel U, du Bois RM, Fagan EA, Fishman RS, Glaspole I, Glassberg MK, King TE, Lederer DJ, Lin Z, **Nathan SD**, Pereira CA, Swigris JJ, Valeyre D, Noble PW. Safety of Pirfenidone in Patients with Idiopathic Pulmonary Fibrosis: Integrated Analysis of Cumulative Data from 5 Clinical Trials. *BMJ Open Resp Res* 2016;3:e000105. doi:10.1136/bmjresp-2015-000105

76. Shin S, King CS, Puri N, Shlobin OA, Brown AW, Ahmad S, Weir N, **Nathan SD**. Pulmonary artery size as a predictor of outcomes in idiopathic pulmonary fibrosis. *Eur Respir J* 2016; 47: 1445–1451

77. **Nathan SD**, Albera C, Bradford WZ, Costabel U, du Bois RM, Fagan EA, Fishman FS, Glaspole I, Glassberg MK, Glasscock KF, King TE, Lancaster L, Lederer DJ, Lin Z, Pereira CA, Swigris JJ, Valeyre D, Noble PW, Wells A. Effect of Continued Treatment with Pirfenidone Following Clinically Meaningful Declines in Forced Vital Capacity: Analysis of Data from Three Phase 3 Trials in Patients with Idiopathic Pulmonary Fibrosis. *Thorax*. 2016 Thorax 2016;71:429-435 doi:10.1136/thoraxjnl-2015-207011

78. Albera C, Costabel U, Fagan EA, Glassberg MK, Gorina E, Tang H, Lancaster L, Lederer DJ, **Nathan SD**, Spirig D, Swigris JJ. Efficacy of pirfenidone in patients with idiopathic pulmonary fibrosis with more preserved lung function. *Eur Res J* 2016;48:843-51

79. Fischer A, Gillies H, Blair C, Tislow JD, **Nathan SD**. Ambrisentan Response in Connective Tissue Disease-Associated Pulmonary Arterial Hypertension- Subgroup Analysis of the ARIES-E Clinical Trial. *Respiratory Medicine* 2016;117:254-263.

80. Hong A, King CS, Brown AW, Ahmad S, Shlobin OA, Khandhar S, Bogar L, Burton N, Rongione A, **Nathan SD**. Hemothorax Following Lung Transplantation: Incidence, Risk Factors, and Effect on Morbidity and Mortality. *Multidisciplinary Respiratory Medicine* 2016 11:40 DOI 10.1186/s40248-016-0075-y

81. **Nathan SD**, Albera C, Bradford WZ, Costabel U, Glaspole I, Glassberg MK, Kardatzk DR, Daigl M, Kirchgaessner K, Lancaster LH, Lederer DJ, Pereira CA, Swigris JJ, Valeyre D, Noble PW. Effect of Pirfenidone on Mortality: Pooled and Meta Analyses of Three Phase 3 IPF Clinical Trials. *Lancet Respir Med*. 2017 Jan;5(1):33-41. doi: 10.1016/S2213-2600(16)30326-5.

82. Fisher M, **Nathan SD**, Hill C, Marshall J, Dejonckheere F, Thuresson PO, Maher T. Predicting life expectancy for pirfenidone in idiopathic pulmonary fibrosis. *J Manag Care Spec Pharm*. 2017;23(3-b):S17-S24

83. King CS, Franco-Palacios D, Valentine V, Shlobin OA, Brown AW, Singh R, **Nathan SD**. Early Post-Operative Management After Lung Transplantation: Results of an International Survey. *Clin Transplant*. 2017 Jul;31(7). doi: 10.1111/ctr.12985. Epub 2017 May 29

84. Jose A, King C, Shlobin OA, Kiernan J, Cossa N, **Nathan SD**. Ventricular diastolic pressure ratio as a marker of treatment response in pulmonary arterial hypertension. *Chest* 2017; 152(5):980-989
85. Kaler M, Barochia AV, Weir NA, Cuento RA, Stylianou M, Roth MJ, Filie A, Vaughey EC, **Nathan SD**, Levine SJ. A Randomized, Placebo-controlled, Double-blinded, Crossover Trial of the PPAR-g Agonist, Pioglitazone, for Severe Asthma. *J Allergy Clin Immunol*. 2017 Dec;140(6):1716-1718.
86. Nett RJ, Cummings KJ, Cannon B, Cox-Ganser J, **Nathan SD**. Dental Personnel Treated for Idiopathic Pulmonary Fibrosis at a Tertiary Care Center — Virginia, 2000–2015. *MMWR Weekly* March 9 2018;Vol.67,No.9
87. Agbor-Enoh S, Jackson A, Tunc I, Berry G, Cochrane A, Grimm D, Davis A, Shah P, Brown AW, Wang Y, Timofte I, Shah P, Gorham S, Wylie J, Goodwin N, Jang MK, Marishta A, Bhatti K, Fideli U, Yang Y, Luikart H, Piroozna M, Zhu J, Iacono A, **Nathan SD**, Orens J, Valentine HA, Khush K. Late manifestation of allo-antibody-associated injury and clinical pulmonary antibody mediated rejection (AMR), evidence from cell-free DNA analysis. *J Heart Lung Transplant*. 2018 Jul;37(7):925-932. doi: 10.1016/j.healun.2018.01.1305.
88. Yeo J, Chen T, Crawford EL, Zhang X, Khuder S, Levin A, Nana-Sinkam P, Massion PP, Arenberg DA, Midtun D, Mazzone PJ, **Nathan SD**, Wainz R, Silvestri G, Tita J, Willey JC. A COPD classifier based on targeted next generation sequencing analysis of genome maintenance genes in normal airway epithelial cells. *BMC Pulm Med*. 2018 Mar 5;18(1):42. doi: 10.1186/s12890-018-0603-y.
89. Rodriguez LR, Emblom-Callahan M, Chhina M, Bui S, Aljeburly B, Tran LH, Novak R, **Nathan SD**, Grant GM. Novel Role for CXCL14/CXCR4 revealed through Global Gene Expression Analysis in an in vitro Fibroblast Model of Idiopathic Pulmonary Fibrosis. *Sci Rep*. 2018 Mar 5;8(1):3983. doi: 10.1038/s41598-018-21889-7.
90. Behr J, **Nathan SD**, Harari S, Wyuts W, Kirchgaessner K, Bengus M, Gilberg F, Wells A. Sildenafil added to pirfenidone in patients with advanced idiopathic pulmonary fibrosis and pulmonary hypertension: A Phase IIb randomised double-blind placebo-controlled study. *Respir Med* 2018 May;138:13-20. doi: 10.1016/j.rmed.2018.03.019.
91. King CS, Brown AW, Shlobin O, Weir N, Libre M, Franco-Palacios D, Ahmad S, **Nathan SD**. Incidence and Impact of WHO Group 3 Pulmonary Hypertension in Idiopathic Nonspecific Interstitial Pneumonia. *Eur Respir J* 2018; 52: 1800545. doi: 10.1183/13993003.00545-2018
92. Maher TM, Swigris JJ, Kreuter M, Wijsenbeek M, Cassidy N, Ireland L, Axmann J, **Nathan SD**. Identifying barriers to IPF treatment- A survey of patient and physician views. *Respiration* 2018 Aug 16:1-11
93. **Nathan SD**, Lancaster LH, Albera C, Glassberg MK, Swigris JJ, Gilberg F, Kirchgaessner KU, Limb SL, Petzinger U, Noble PW. Dose modification and dose intensity during treatment with pirfenidone: analysis of pooled data from three multinational Phase III trials. *BMJ Open Respir Res*. 2018 Aug 2;5(1):e000323. doi: 10.1136/bmjresp-2018-000323. eCollection 2018.

94. Arun J, King CS, Shlobin OA, Brown AW, Wang C, **Nathan SD**. Pulmonary Hemodynamic Responses Predict Outcomes in Patients with Fibrotic Lung Disease Undergoing Exercise Right Heart Catheterization Testing. *Eur Respir J* 2018 Sep;52(3)
95. Rhodes C et al. (**Nathan SD** among 118 co-authors). Genetic determinants of risk and survival in pulmonary arterial hypertension. *Lancet Res Med* 2019;7:227-238
96. Woolstenhulme JG, Guccione AA, Herrick JE, Collins JP, **Nathan SD**, Chan LE, Keyser RE. Left Ventricular Function Before and After Aerobic Exercise Training in Women Who Have Pulmonary Arterial Hypertension. *J Cardiopulm Rehabil Prev*. 2019 Mar;39(2):118-126.
97. **Nathan SD**, Costabel U, Glaspole I, Glassberg MK, Lancaster LH, Lederer DJ, Pereira CA, Trzaskoma B, Morgenthien E, Limb SL, Wells AU. Incidence of Multiple Progression Events: Pooled Analysis of Patients With Idiopathic Pulmonary Fibrosis Treated With Pirfenidone. *Chest* 2019; 155(4):712-719
98. Raghu G, Flaherty KR, Lederer DJ, Lynch DA, Colby TV, Myers JL, Groshong SD, Larsen BT, Chung JH, Steele MP, Benzaquen S, Calero K, Case A, Criner G, Guerrero J, **Nathan SD**, Rai N, Ramaswamy M, Hagemeyer L, Davis JR, Gauhar U, Pankratz DG, Choi Y, Huang J, Walsh PS, Neville H, Lofaro LR, Barth NM, Kennedy GC, Brown KK, Martinez FJ. Diagnostic accuracy of conventional transbronchial biopsies through the use of a molecular classifier for usual interstitial pneumonia pattern. *Lancet Res Med* 2019;7:487-496
99. Agbor-Enoh S, Wang Y, Tunc I, Davis A, Jang MK, De Vlaminck I, Shah PD, Timofte I, Brown AW, Marihsta A, Bhatti K, Gorham S, Wylie J, Goodwin N, Yang Y, Patel K, Fideli U, Luikart H, Zhu J, Iacono A, Orens J, **Nathan SD**, Marboe C, Berry GJ, Quake SR, Khush K, Valantine HA. Trends of early allograft injury measured via donor-derived cell-free DNA and poor outcomes after lung transplantation. *EBioMedicine*.2019;40:541-553
100. **Nathan SD**, Costabel U, Albera C, Behr J, Wuyts W, Kirchgaessler KU, Stauffer J, Morgenthien E, Chou W, Noble PW. Pirfenidone in patients with idiopathic pulmonary fibrosis and more advanced lung function impairment. *Respir Med*. 2019;153: 44-51
101. Moore C, Blumhagen RZ, Yang IV, Walts A, Powers J, Walker T, Bishop M, Russell P, Vestal B, Cardwell J, Markin CR, Mathai SK, Schwarz MI, Steele MP, Lee J, Brown KK, Loyd JE, Lynch D, Crapo JD, Silverman EK, Cho MH, James JA, Guthridge JM, Cogan JD, Kropski JA, Swigris JJ, Bair C, Kim DS, Ji W, Kim H, Song JW, Maier LA, Pacheco KA, Hirani N, Poon AS, Li F, Jenkins RG, Braybrooke R, Saini G, Maher TM, Molyneaux PL, Saunders P, Zhang Y, Gibson KF, Kass DJ, Rojas M, Sembrat J, Wolters PJ, Collard HR, Sundy JS, O'Riordan T, Strek ME, Noth I, Ma S, Porteous MK, Kreider ME, Patel NB, Inoue Y, Hirose M, Arai T, Akagawa S, Eickelberg O, Fernandez IE, Behr J, Mogulkoc N, Corte TJ, Glaspole I, Tomassetti S, Ravaglia C, Poletti V, Crestani B, Borie R, Kannengiesser C, Parfrey H, Fiddler C, Rassl D, Molina-Molina M, Machahua C, Worboys AM, Gudmundsson G, Isaksson HJ, Lederer DL, Podolanczuk AJ, Montesi SB, Bendstrup E, Danel V, Selman M, Pardo A, Henry MT, Keane MP, Doran P, Vašáková M, Sterclova M, Ryerson CJ, Wilcox PG, Okamoto T, Furusawa H, Miyazaki Y, Laurent G, Baltic S, Prele C, Moodley Y, Shea BS, Ohta K, Suzukawa M, Narumoto O, **Nathan SD**, Venuto DC, Woldehanna ML, Kokturk N, de Andrade JA, Luckhardt T, Kulkarni T, Bonella F, Donnelly SC, McElroy A, Armstrong ME, Aranda A, Carbone RG, Puppo F, Beckman KB, Nickerson DA, Fingerlin TE, Schwartz DA. Resequencing Study Confirms Host

Defense and Cell Senescence Gene Variants Contribute to the Risk of Idiopathic Pulmonary Fibrosis. Am J Respir Crit Care Med 2019;200:199-208

102. Rodriguez L, Bui S, Beuschel R, Ellis E, Liberti E, Chhina M, Cannon B, Lemma M, **Nathan SD**, Grant G. Curcumin Induced Oxidative Stress Attenuation by N-acetylcysteine Cotreatment: A Fibroblast and Epithelial Cell *in-vitro* Study in Idiopathic Pulmonary Fibrosis. Mol Med. 2019 Jun 13;25(1):27. doi: 10.1186/s10020-019-0096-z.
103. **Nathan SD**, Behr J, Collard HR, Cottin V, Hoeper MM, Martinez F, Corte T, Keogh A, Leuchte H, Mogulkoc N, Ulrich S, Wuyts W, Shah S, Yao M, Boateng F, Wells A. Riociguat for Idiopathic Interstitial Pneumonia-Associated Pulmonary Hypertension: The Randomized RISE-IIP Study. Lancet Res Med 2019 7:780-790
104. Ratwani A, Ahmad KI, Barnett SD, **Nathan SD**, Brown AW. Connective Tissue Disease Associated Interstitial Lung Disease and Outcomes After Hospitalization: A Cohort Study. Respir Med. 2019 Jun 4;154:1-5. doi: 10.1016/j.rmed.2019.05.020. [Epub ahead of print]
105. Sonti R, Gersten RA, Barnett SD, Brown AW, **Nathan SD**. Multimodal Noninvasive Prediction of Pulmonary Hypertension in IPF. Clin Respir J. 2019 Sep;13(9):567-573. doi: 10.1111/crj.13059. Epub 2019 Jul 30.
106. Glassberg MK, **Nathan SD**, Lin C, Lew C, Morgenthien E, Day B, Stauffer J, Chou W, Noble PW. Cardiovascular and Bleeding Risk Factors and Events in Patients With Idiopathic Pulmonary Fibrosis From 3 Phase III Trials of Pirfenidone. Adv Ther. 2019 Oct;36(10):2910-2926. doi: 10.1007/s12325-019-01052-y. Epub 2019 Aug 10. Erratum in: Adv Ther. 2019 Sep 9;
107. Aryal S, Katugaha S, Cochrane A, Brown AW, Shlobin OS, Ahmad K, **Nathan SD**, Marinak L, Desai S, King C. Single Center Experience with Use of Letermovir for CMV Prophylaxis or Treatment in Thoracic Organ Transplant Recipients. Transpl Infect Dis. 2019 Dec;21(6):e13166. doi: 10.1111/tid.13166. Epub 2019 Sep 18
108. **Nathan SD**, Yang M, Morgenthaler EA, Stauffer JL. Forced Vital Capacity in Patients With Idiopathic Pulmonary Fibrosis: FVC variability in patients with IPF and role of 6-min walk test to predict further change. Eur Respir J 2020; 55: 1902151 (<https://doi.org/10.1183/13993003.02151-2019>)
109. **Nathan SD**, Flaherty K, Glassberg MK, Raghu G, Swigris J, Alvarez R, Ettinger N, , J. Loyd, P. Fernandes8, H. Gillies, P. Shah, M. Dekker, L. Lancaster. A Randomized, Double-Blind, Placebo-Controlled Study of Pulsed, Inhaled Nitric Oxide in Subjects at Risk of Pulmonary Hypertension Associated With Pulmonary Fibrosis. Chest 2020 158:637-645
110. Shlobin OA, Kouranos V, Barnett S, Alhamad EH, Culver DA, Barney J, Cordova FC, Carmona EM, Scholand MB, Wijsenbeek M, Ganesh S, Birring SB, O'Hare L, Baran JM, Cal JG, Lower EE, Engel PJ, Wells AU, **Nathan SD**, Baughman RP. Survival of Patients with Sarcoidosis Associated Pulmonary Hypertension: Physiological Predictors of Survival in Patients with Sarcoidosis Associated Pulmonary Hypertension: Results from a Multi-National Registry Cohort. Eur Respir J 2020 55:1901747; published ahead of print 2020, doi:10.1183/13993003.01747-2019

111. Zhang M, Haughey M, Bleasle K, Couto S, Belka I, Hoey T, Groza M, Drew C, Hartke J, Bennett B, Cain J, Gurney A, Lachowicz J, Carayannopoulos L, **Nathan SD**, Distler J, Brenner D, Hariharan K, Cho H, Xie W. Targeting the Wnt pathway through R-spondin 3 identifies an anti-fibrosis treatment strategy for multiple organs. *PLoS One.* 2020 Mar 11;15(3):e0229445. doi: 10.1371/journal.pone.0229445. eCollection 2020. PMID: 32160239
112. Alqawba M, Rodriguez LR, Beuschel RT, Kaler M, Barochia AV, Levine SJ, **Nathan SD**, Grant G, Diawara N. Classification Models of Idiopathic Pulmonary Fibrosis Patients. Accepted to International Journal of Respiratory and Pulmonary Medicine 2020;7:131. DOI: 10.23937/2378-3516/1410131
113. Franck Rahaghi; Zeenat Safdar; Anne Whitney Brown; Joao A. de Andrade; Kevin R. Flaherty; Robert J. Kaner; Christopher S. King; Maria L. Padilla; Imre Noth; Mary Beth Scholand; Adrien Shifren; **Steven D. Nathan.** Expert consensus on the management of adverse events and prescribing practices associated with the treatment of patients taking pirfenidone for idiopathic pulmonary fibrosis: A Delphi consensus study. *BMC Pulm Med.* 2020 Jul 14;20(1):191. doi: 10.1186/s12890-020-01209-4. PMID: 32664913
114. **Nathan SD;** Brown AW; Nesrin Mogulkoc; Soares F; Collins AC; Cheng JM; Peterson J; Cannon B; Barnett SD, The White Blood Cell Count as a Prognostic Indicator in Idiopathic Pulmonary Fibrosis. *Respiratory Medicine* 170 (2020) 106068. <https://doi.org/10.1016/j.rmed.2020.106068>
115. Raghu G, Colby TV, Myers JL, Steele MP, Benzaquen S, Calero K, Case AH, Criner GJ, **Nathan SD**, Rai NS, Hagsmeyer L, Davis JR, Bhorade SM, Kennedy GC, Gauher UA, Martinez FJ. A Molecular Classifier that identifies Usual Interstitial Pneumonia in Transbronchial Biopsy Specimens of Patients with Interstitial Lung Disease. *Chest.* 2020 May;157(5):1391-1392. doi: 10.1016/j.chest.2019.10.061.
116. Zhang M, Haughey M, Wang NY, Bleasle K, Kapoun AM, Couto S, Belka I, Hoey T, Groza M, Hartke J, Bennett B, Cain J, Gurney A, Benish B, Castiglioni P, Drew C, Lachowicz J, Carayannopoulos L, **Nathan SD**, Distler J, Brenner DA, Hariharan K, Cho H, Xie W. Targeting the Wnt signal pathway through R-spondin 3 identifies an anti-fibrosis treatment strategy for multiple organs. *PLoS One.* 2020 Mar 11;15(3):e0229445. doi: 10.1371/journal.pone.0229445. eCollection 2020
117. Luca Richeldi, Mary Beth Scholand, David A Lynch, Thomas V Colby, Jeffrey L Myers, Steve D Groshong, Jonathan H Chung, Sadia Benzaquen, **Steven D Nathan**, J Russell Davis, Shelley L Schmidt, Lars Hagsmeyer, David Sonetti, Jurgen Hetzel, Gerard J Criner, Amy H Case, Murali Ramaswamy, Karel Calero, Umair A Gauhar, Yoonha Choi, Daniel G Pankratz, P Sean Walsh, Lori R Lofaro, Jing Huang, Sangeeta M. Bhorade, Giulia C Kennedy, Fernando Martinez, Ganesh Raghu. Utility of a molecular classifier as a complement to HRCT in identifying Usual Interstitial Pneumonia. *Am J Respir Crit Care Med* Vol 203, Iss 2, pp 211–220, Jan 15, 2021
118. Behr J, **Nathan SD**, Wuyts WA, Mogulkoc Bishop N, Bouros DE, Antoniou K, Guiot J, Kramer MR, Kirchgaessner K, Bengus M, Gilberg F, Perjesi A, Harari S, Wells AU. Efficacy and safety of sildenafil added to pirfenidone in patients with advanced idiopathic pulmonary fibrosis and risk of pulmonary hypertension. *Lancet Respir Med* 2021; 9: 85–95
119. Wang, Bonnie R; Edwards, Rex; Freiheit, Elizabeth A; Ma, Yicheng; Burg, Cindy; de Andrade, Joao; Lancaster, Lisa; Lindell, Kathy; **Nathan, Steven D.**; Ganesh, Raghu; Gibson, Kevin; Gulati, Mridu; Mason, Wendi; Noth, Imre; Schmidt, Bill; Spino, Cathie; Staszak, Scott; Stauffer, Jack; Wolters, Paul; Cosgrove, G; Flaherty, Kevin R. The Pulmonary Fibrosis Foundation Patient Registry: Rationale, Design, and Methods. *Ann Am Thorac Soc.* Vol 17, No 12, pp 1620–1628, Dec 2020

120. Jean Pastre; Sandeep Khandhar; Scott Barnett; Inga Ksovreli; Haresh Mani; A. Whitney Brown; Oksana A. Shlobin; Kareem Ahmad; Vikramjit Khangoora; Shambhu Aryal; Diana L. Morris; Christopher S. King; **Steven D. Nathan.** Surgical lung biopsy for interstitial lung disease: safety and feasibility at a tertiary referral center. Ann Am Thorac Soc. 2021 Mar;18(3):460-467. doi: 10.1513/AnnalsATS.202006-759OC.

121. **Nathan SD,** Pastre J, Ksovreli I, Barnett S, King C, Aryal S, Ahmad K, Fukuda C, Ramalingam V, Chung JH. HRCT Evaluation of patients with interstitial lung disease: Comparison of the 2018 and 2011 Diagnostic Guidelines. Ther Adv Respir Dis. 2020 Jan-Dec;14:1753466620968496. doi: 10.1177/1753466620968496

122. King C, Freiheit, E, Brown AW, Shlobin OA, Aryal S, Ahmad K, Khangoora V, Flaherty K, Venuto D, **Nathan SD.** Effects of Anticoagulation on Survival in Interstitial Lung Disease: An Analysis of the Pulmonary Fibrosis Foundation (PFF) Registry. Chest. 2020 Oct 16:S0012-3692(20)34911-4. doi: 10.1016/j.chest.2020.10.019.

123. Waxman A, Restrepo R, Thenappan, T, Ravichandran A, Engel P, Bajwa A,, Allen R, Feldman J, Argula R, Smith P, Rollins K, Deng CQ, Peterson L, Bell H, Tapson V, **Nathan SD.** Inhaled Treprostinil in Patients with Pulmonary Hypertension due to Interstitial Lung Disease. N Engl J Med 2021; 384:325-334 DOI: 10.1056/NEJMoa2008470

124. Christopher S. King, Dhwani Sahjwani, A. Whitney Brown, Saad Feroz, Paula Cameron, Erik Osborn, Mehul Desai, Svetolik Djurkovic, Aditya Kasarabada, Rachel Hinerman, James Lantry, Alan Speir, Oksana A. Shlobin, Kareem Ahmad, Vikramjit Khangoora, Shambhu Aryal, A. Claire Collins, **Steven Nathan.** Outcomes of Mechanically Ventilated Patients with COVID-19 Associated Respiratory Failure. PLoS ONE 15(11):e0242651. <https://doi.org/10.1371/journal.pone.0242651>

125. Jean Pastre; Scott D Barnett; Inga Ksovreli; Jeannie Taylor; A. Whitney Brown; Oksana A. Shlobin; Kareem Ahmad; Vikramjit Khangoora; Shambhu Aryal; Christopher S. King; **Steven D. Nathan.** Idiopathic pulmonary fibrosis patients with severe physiologic deficit: characteristics and outcomes. Respir Res (2021) 22:5 <https://doi.org/10.1186/s12931-020-01600-z>

126. Chandel A, Patolia S, Brown AW, Collins AC, Sahjwani D, Khangoora V, Cameron PC, Desai M, Kasarabada A, Kilcullen JK, **Nathan SD**, King CS. High-flow nasal cannula in COVID-19: Outcomes of application and examination of the ROX index to predict success. Respir Care. 2020 Dec 16:resp care.08631. doi: 10.4187/resp care.08631. Epub ahead of print. PMID: 33328179.

127. Chandel A, Patolia S, Looby M, Dalton H, Bade N, Khangoora V, Desai M, Lantry J, Osborn E, Djurkovic S, Tang D, **Nathan SD**, King CS. Association of D-dimer and fibrinogen magnitude with hypercoagulability by thromboelastography in severe COVID-19. medRxiv 2020.07.27.20162842; doi: <https://doi.org/10.1101/2020.07.27.20162842>

128. Nunes FS, Pastre J, Brown AW, Alhalabi L, Shlobin OA, King C, Weir NA, **Nathan SD.** Functional Assessment of Advanced Lung Disease Patients with a 1-minute Stair Step Test: Comparison with 6-minute Walk Test. Sarc Vasc and Diff Lung Dis 2021; 38 (1); e2020026 DOI: 10.36141/svdld.v38i1.9258

129. Amisha V. Barochia, Maryann Kaler, Nargues Weir, Elizabeth M. Gordon, Debbie M. Figueroa, Merte Lemma WoldeHanna, Maureen Sampson, Alan T. Remaley, Geraldine Grant, Scott D. Barnett, **Steven D.**

Nathan, and Stewart J. Levine MR. Spectroscopy Identifies that Serum Levels of Small HDL Particles are Negatively Correlated with Death or Lung Transplantation in Idiopathic Pulmonary Fibrosis. *Eur Respir J* 2021; 58: 2004053 [DOI: 10.1183/13993003.04053-2020].

130. **Nathan SD**, Cottin V, Behr J, Hoeper MM, Martinez F, Corte T, Keogh AM, Leuchte H, Mogulkoc N, Ulrich S, Wuyts WA, Yao Z, Ley-Zaporozhan J, Müller-Lisse GU, Scholle FD, Brueggenwerth G, Busse D, Nikkho S, Wells AU. Impact of lung morphology on clinical outcomes with riociguat in the RISE-IIP study. *J Heart Lung Transplant* 2021;40:494–503
131. **Nathan SD**, Barnett S, King C, Barberà JA, Olschewski H, Provencher S, Shlobin O, Seeger W. Impact of the new definition for pulmonary hypertension in patients with lung disease: An analysis of the UNOS database. *Pulm Circ*. 2021 Mar 30;11(2):2045894021999960. doi: 10.1177/2045894021999960
132. Michael Keller, Errol Bush⁵, Joshua M. Diamond, Pali Shah, Joby Matthews, Anne W Brown⁸, Junfeng Sun, Irina Timofte, Hyesik Kong, Ilker Tunc, Helen Luikart, Aldo Iacono, **Steven Nathan**, Kiran K. Khush, Jonathan Orens, Moon Jang⁴, Hannah A Valentine, Sean Agbor-Enoh. Use of Donor-Derived-Cell-Free DNA as a Marker of Early Allograft Injury in Primary Graft Dysfunction (PGD) to Predict the Risk of Chronic Lung Allograft Dysfunction (CLAD). *J Heart Lung Transplant*. 2021 Feb 20:S1053-2498(21)02180-X. doi: 10.1016/j.healun.2021.02.008. Online ahead of print.
133. DuBrock H, **Nathan SD**, Kolaitis N, Mathai S, Reeve B, Martin S, Olayinka-Amao B, Classi P, Nelsen A. The Patient Experience of Symptoms and Impacts in WHO Group 3 Pulmonary Hypertension. *Pulm Circ*. 2021 Apr 1;11(2):20458940211005641. doi: 10.1177/20458940211005641
134. Temesgen E, Andargie Naoko Tsuji, Fayaz Seifuddin, Moon Kyoo Jang, Peter S.T. Yuen, Hyesik Kong, Ilker Tunc, Komudi Singh, Ananth Charya, Alison Grazioli, **Steven D. Nathan**, Andrea Cox, Mehdi Pirooznia, Robert A. Star, Sean Agbor-Enoh. Cell-free DNA maps tissue injury and risk of death, and propagates tissue injury in COVID-19 patients. Accepted to the Journal of Clinical Investigation Insight 2021;6(7):e147610.<https://doi.org/10.1172/jci.insight.1476>
135. Chung JH, Montner SM, Thirkateh P, Cannon B, Barnett SB, **Nathan SD**. CT findings suggestive of connective tissue disease in the setting of usual interstitial pneumonia. *J Comput Assist Tomogr*. 2021 Sep-Oct 01;45(5):776-781. doi: 10.1097/RCT.0000000000001230. PMID: 34546682
136. **Nathan SD**, Mehta J, Stauffer J, Morgenthien E, Yang M, Limb S, Bhorade S. Changes in Neutrophil-Lymphocyte and Platelet-Lymphocyte Ratios and Clinical Outcomes in Idiopathic Pulmonary Fibrosis. *J. Clin. Med.* **2021**, *10*, 1427. <https://doi.org/10.3390/jcm10071427>
137. **Steven D. Nathan**, Aaron Waxman, MD, Sudarshan Rajagopal, Amy Case, Shilpa Johri, Hilary DuBrock, David De La Zerda, Sandeep Sahay, Christopher King, Lana Melendres-Groves, Peter Smith, Eric Shen, Lisa Edwards, Andrew Nelsen, Victor Tapson. Inhaled Treprostinil and FVC change in Patients with Interstitial Lung Disease and associated Pulmonary Hypertension. *Lancet Respir Med*. 2021 Nov;9(11):1266-1274. doi: 10.1016/S2213-2600(21)00165-X.
138. Jean Pastre; Scott Barnett; Inga Ksovrel; Nesrin Mogulkoc; Vijaya Ramalingam; Cesar Fukuda; Anusha Yelisetty; Ömer Selim Unat; A. Whitney Brown; Oksana A. Shlobin; Kareem Ahmad; Vikramjit Khangoora; Shambhu Aryal; Christopher King; **Steven D. Nathan**. Development and validation of a clinical diagnostic scoring system for the diagnosis of IPF. *Ann Am Thorac Soc Vol 18, No 11, pp 1803–1810*, Nov 2021

139. Abhimanyu Chandel, Alison Verster, Hussna Rahim, Vikramjit Kanghoora, **Steven D. Nathan**, Kareem Ahmad, Shambhu Aryal, Aaron Bagnola, Anju Singhal, A. Whitney Brown, Oksana A. Shlobin, Christopher S. King. Incidence and prognostic significance of pleural effusions in patients with pulmonary arterial hypertension. *Pulm Circ.* 2021 Apr 28;11(2):20458940211012366. doi: 10.1177/20458940211012366. eCollection 2021 Apr-Jun. PMID: 33996030

140. Lauren C. Testa, Yvon Jule, Linnea Lundh, Karine Bertotti, Melissa A. Merideth, Kevin J. O'Brien, Olivier Jule, **Steven D. Nathan**, Drew C. Venuto, Souheil El-Chemaly, May Christine V. Malicdan, Bernadette R. Gochuico. Automated Quantification of Pulmonary Fibrosis in Human Histopathology Specimens. *Front. Med.*, 15 June 2021 | <https://doi.org/10.3389/fmed.2021.607720>

141. Katrina Bazemore, Michael Rohly, Nitipong Permpalung, Irina Timofte, A. Whitney Brown, Jonathan Orens, Aldo Iacono, **Steven D. Nathan**, Robin K Avery, Hannah Valentine, Sean Agbor-Enoh, Pali D Shah. Donor Derived Cell Free DNA% is elevated with pathogens that are risk factors for Acute and Chronic Lung Allograft Injury. *J Heart Lung Transplant.* 2021;40:1454-1462

142. Chung JH, Adegunsoye A, Cannon B, Vij R, Oldham JM, King CS, Montner SM, Thirkateh P, Barnett SB, Karwoski RA, Bartholmai BJ, Strek ME, **Nathan SD**. Differentiation of idiopathic pulmonary fibrosis from connective tissue disease related interstitial lung disease using quantitative imaging. *J. Clin. Med.* 2021, 10, 2663. <https://doi.org/10.3390/jcm10122663>

143. Jang MK, Tunc I, Berry GJ, Marboe C, Kong H, Keller MB, Shah PD, Timofte I, Brown AW, Ponor IL, Mutebi C, Philogene MC, Yu K, Iacono A, Orens JB, **Nathan SD**, Agbor-Enoh S. Donor-derived cell-free DNA accurately detects acute rejection in lung transplant recipients, a multicenter cohort study. *J Heart Lung Transplant.* 2021 Apr 24:S1053-2498(21)02281-6. doi: 10.1016/j.healun.2021.04.009. Online ahead of print.

144. Baughman RP, Shlobin OA, Gupta R, Engel PE, Stewart J, Lowere EE, Rahaghi F, Zeigler J, **Nathan SD**. Riociguat for Sarcoidosis Associated Pulmonary Hypertension: Results of a One Year Double Blind, Placebo Controlled Trial. *CHEST* 2022; 161(2):448-457

145. Abhimanyu Chandel Saloni Patolia, Kareem Ahmad, Shambhu Aryal, A. Whitney Brown, Dhwani Sahjwani, Vikramjit Khangoora, Oksana A. Shlobin, Paula C. Cameron, Anju Singhal, Arthur W. Holtzclaw, Mehul Desai, **Steven D. Nathan**, Christopher S. King. Inhaled nitric oxide via high-flow nasal cannula in patients with acute respiratory failure related to COVID-19. *Clin Med Insights Circ Respir Pulm Med.* 2021 Sep 29;15:11795484211047065. doi: 10.1177/11795484211047065. eCollection 2021.

146. Jeffrey R. Strich, Xin Tian³, Mohamed Samour, Christopher King, Oksana Shlobin, Robert Reger, Johnathan Cohen, Kareem Ahmad, A Whitney Brown, Vikramjit Khangoora, Shambhu Aryal, Yazan Migdady, Jennifer Jo Kyte, Jungnam Joo, Rebecca Hays, Ashley Collins, Edwinia Battle, Janet Valdez, Josef Rivero, Ick-ko Kim, Julie Erb-Alvarez, Ruba Shalhoub, Mala Chakraborty, Susan Wong, Benjamin Colton, Marcos J. Ramos-Benitez, Seth Warner, Daniel S. Chertow, Kenneth Olivier, Georg Aue, Richard T. Davey, Anthony F. Suffredini, Richard W. Childs, **Steven D. Nathan**. Fostamatinib for the Treatment of Hospitalized Adults with Covid-19. *Clin Infect Dis.* 2021 Sep 1:ciab732. doi: 10.1093/cid/ciab732. Online ahead of print. PMID: 34467402

147. Christopher S. King, Kevin R. Flaherty, Marilyn K. Glassberg, Lisa Lancaster, Ganesh Raghu, Jeffrey J. Swigris, Rahul G. Argula, Rosemarie A. Dudenkofer, Neil A. Ettinger, Jeremy Feldman; Shilpa Johri, P Fernandes, M. Pharm. Ed Parsley; Parag Shah; **Steven D. Nathan..** A Phase-2 Exploratory Randomized Controlled Trial of INOpulse in Patients with Fibrotic Interstitial Lung Disease Requiring Oxygen. Ann Am Thorac Soc. 2022 Apr;19(4):594-602. doi: 10.1513/AnnalsATS.202107-864OC.

148. **Nathan SD**, Tapson VF, Elwing J, Rischard F, Mehta J, Shapiro S, Shen E, Deng C, Smith P, Waxman A. Efficacy of inhaled treprostinil on multiple disease progression events in patients with pulmonary hypertension due to parenchymal lung disease in the INCREASE trial. Steven D. Nathan, Victor F. Tapson, Jean Elwing, Franz Rischard, Jinesh Mehta, Shelley Shapiro, Eric Shen, Lisa Edwards, Peter Smith, Aaron Waxman. Efficacy of inhaled treprostinil on multiple disease progression events in patients with pulmonary hypertension due to parenchymal lung disease in the INCREASE trial. Am J Respir Crit Care Med. 2022 Jan 15;205(2):198-207. doi: 10.1164/rccm.202107-1766OC. PMID: 34767495

149. Na'ama Avitzur, Elizabeth M. Noth, Mubasiru Lamidi, **Steven D. Nathan**, Harold R. Collard, Alison M. DeDent, Neeta Thakur, Kerri A. Johannson. Environmental Health, Disease Severity, and Anti-fibrotic Use in Patients with Idiopathic Pulmonary Fibrosis. Thorax 2022;77:1237–1242.

150. Marloes Huitema, Marco C Post; Jan C Grutters; Athol U Wells; Vasilis Kouranos; Oksana Shlobin; **Steven D Nathan**; Daniel A Culver; Joseph Barney; Rohit Gupta; Eva Carmona; Esam H Alhamad; Mary B Scholand; Marlies Wijsenbeek; Sivagini Ganesh; Elyse E Lower; Peter J Engel; Robert P Baughman. Echocardiographic estimate of pulmonary artery pressure in sarcoidosis patients, a multi-national study. Sarcoidosis Vasc Diffuse Lung Dis. 2022;38(4):e2021032. doi: 10.36141/svdld.v38i4.11376. Epub 2022 Jan 13. PMID: 35115744

151. Franck Rahaghi, Nicholas A. Kolaitis, Ayodeji Adegunsoye, Joao de Andrade, Kevin Flaherty, Lisa Lancaster, Joyce S. Lee, Deborah Levine, Ioana Preston, Zeenat Safdar, Rajan Saggar, Sandeep Sahay, Mary Beth Scholand, Oksana Shlobin, David A Zisman, **Steven D. Nathan.** Delphi Consensus Recommendations on Screening for Pulmonary Hypertension in Patients With Interstitial Lung Disease. Chest. 2022 ;162(1):145-155

152. Michael B. Keller, Rohan Meda, Sheng Fu, Kai Yu, Moon Kyoo Jang,, Ananth Charya, Gerald J. Berry, Charles Marboe, Hyesik Kong, Helen Luikart, Ileana L. Ponor, Pali D. Shah, Kiran K Khush, , **Steven D. Nathan**, Sean Agbor-Enoh. Comparison of Donor-Derived Cell-Free DNA Between Single vs. Double Lung Transplant Recipients. Am J Transplant. 2022;00:1–7

153. Chadel A, Pastre J, Valery S, King CS, **Nathan SD**. Derivation and validation of a simple multidimensional index incorporating exercise capacity parameters for survival prediction in idiopathic pulmonary fibrosis. Thorax. 2023 Apr;78(4):368-375. doi: 10.1136/thoraxjnl-2021-218440.

154. Gupta R, Baughman RP, **Nathan SD**, Wells AU, Kouranos V, Alhamad EH, Culver DA, Barney J, Carmona EM, Cordova FC, Huitema M, Scholand MB, Wijsenbeek M, Ganesh S, Birring SS, Price LC, Wort SJ, Shlobin OA. Value of the Six-Minute Walk Test in Sarcoidosis Associated Pulmonary Hypertension: Results from an International Registry. Respir Med. 2022 May;196:106801. doi: 10.1016/j.rmed.2022.106801. Epub 2022 Mar 16. PMID: 35316723

155. Aryal S, Chakravorty S, Cochrane A, Psotka MA, Regmi A, Marinak L, Thatcher A, Shlobin OA, Brown AW, King CS, Ahmad K, Khangoora V, Singhal A, **Nathan SD**. CMV Infection Following mRNA

SARS-CoV-2 Vaccination in Solid Organ Transplant Recipients Accepted to Transplantation Direct
03/27/2022

156. Katrina Bazemore, Nitipong Permpalung, Joby Mathew, Merte Lemma, Betelihim Haile, Robin Avery, Hyesik Kong, Moon Kyoo Jang, Temesgen Andargie, Shilpa Gopinath, **Steven D. Nathan**, Shambhu Aryal, Jonathan Orens, Sean Agbor-Enoh, Pali Shah. Elevated Cell Free DNA in Respiratory Viral Infection and Associated Lung Allograft Dysfunction. *Am J Transplant* 2022;22:2560–2570

157. **Steven D. Nathan**, Juergen Behr, Vincent Cottin, Lisa Lancaster, Peter Smith, CQ Deng, Natalie Pearce5, Heidi Bell, Leigh Peterson, Kevin R. Flaherty. Study Design and Rationale for the TETON Phase 3, Randomized, Controlled Clinical Trials of Inhaled Treprostinil in the Treatment of Idiopathic Pulmonary Fibrosis. *BMJ Open Resp Res* 2022;9:e001310. doi:10.1136/bmjresp-2022-001310

158. Ananth V. Charya, Adam Cochrane, Ileana L. Ponor, Deborah Levine, Mary Philogene, Yi-Ping Fu, Moon K. Jang,, Hyesik Kong,, Pali Shah, Joby Matthews, Helen Luikart, Kiran Khush, Gerald Berry, Charles Marboe, Aldo Iacono, Jonathan B. Orens, **Steven D. Nathan**, Sean Agbor-Enoh. Clinical Features and Allograft Failure Rates of Pulmonary Antibody-Mediated Rejection Categories. Accepted to *J Heart Lung Transplant* 000;000:1–10 (in press)

159. **Nathan SD**, Deng C, King CS, DuBrock HM, Elwing J, Rajagopal S, Rischard F, Sahay S, Broderick M, Shen E, Smith P, Tapson VF, Waxman AB. Inhaled Treprostinil Dose in Pulmonary Hypertension Associated with Interstitial Lung Disease and Its Effects on Clinical Outcomes. *Chest* 2023;163:398-406

160. Gustaf Wigerblad, Seth Warner, Marcos J. Ramos-Benitez, Lela Kardava, Xin Tian, Rui Miao, Robert Reger, Mala Chakraborty, Susan Wong, Yogendra Kanthi, Anthony F. Suffredini, Stefania Dell'Orso, Stephen Brooks, Christopher King, Oksana Shlobin, **Steven D. Nathan**, Jonathan Cohen, Susan Moir, Richard W. Childs, Mariana J. Kaplan, Daniel S. Chertow, Jeffrey R. Strich. Spleen tyrosine kinase inhibition restores myeloid homeostasis in COVID-19. *Sci. Adv.* 9, eade8272 (2023) 4 January 2023

161. Pelljto AL, **Nathan SD**, Schwartz (116 authors). Idiopathic pulmonary fibrosis is associated with common genetic variants and limited rare variants. to *Am J Res Crit Care Med* 2023;207:1194-1202

162. Michael Keller, Song Yang, Lucia Ponor, Adam Cochrane, Mary Philogene, Errol Bush, Pali Shah, Joby Matthews, Anne W Brown, Hyesik Kong, Ananth Charya, Helen Luikart, **Steven D. Nathan**, Kiran K. Khush, Moon Jang, Sean Agbor-Enoh. Preemptive treatment of deNOVO Donor-Specific Antibodies in lung transplant patients decreases the risk of allograft failure. Accepted to the *American Journal of Transplantation* 11/30/2022

163. EH Louw, G Maarmann, N Baines, M Osman, EM Irusen, CFN Koegelenberg, **SD Nathan**, R Channick, BA Allwood. The prevalence of pulmonary hypertension after tuberculosis treatment in a community sample of adult patients. *Pulmonary Circulation*. 2023;13:e12184.

164. Thomas C, Chandel A, King CS, Aryal S, Brown AW, Khangoora V, Nyquist A, Singhal A, Cantres Fonseca O, Shlobin O, **Nathan SD**. Prevalence of pulmonary hypertension in patients with COVID-19 related lung disease listed for lung transplant: a UNOS Registry Analysis. *Pulm Circ*. 2023 Apr 1;13(2):e12228. doi: 10.1002/pul.2.12228. eCollection 2023 Apr. PMID: 37091120

165. Abhimanyu Chandel, Christopher S. King, Rose Ignacio, Oksana A. Shlobin, Vikramjit Khangoora, Shambhu Aryal, Alan Nyquist, Anju Singhal, Kevin R. Flahert, **Steven D. Nathan**. External Validation

and longitudinal application of the DO-GAP index to individualize survival prediction in IPF patients. ERJ Open Res 2023; 9: 00124-2023 [DOI: 10.1183/23120541.00124-2023].

166. Aaron Waxman, Ricardo Restrepo-Jaramillo, Thenappan Thenappan, Peter Engel, Abubakr Bajwa, Ashwin Ravichandran, Jeremy Feldman, Amy Hajari Case, Victor Tapson, Peter Smith, Chunqin Deng, Eric Shen, **Steven D. Nathan.** Long-term Inhaled Ttreprostilin for Pulmonary Hypertension Due to Interstitial Lung Disease. Eur Respir J. 2023 Jun 29;61(6):2202414. doi: 10.1183/13993003.02414-2022. Print 2023 Jun. PMID: 37080567
167. Jürgen Behr, **Steven D. Nathan**, Ulrich Costabel, Carlo Albera, Wim A. Wuyts, Marilyn K. Glassberg, Harold Haller Jr, Giuseppe Alvaro, Frank Gilberg, Katerina Samara, Lisa Lancaster. Efficacy and safety of pirfenidone in patients with advanced versus non-advanced idiopathic pulmonary fibrosis – post-hoc analysis of six clinical studies. Accepted to Advances in Therapy 05/18/2023
168. Harrison W Farber, Murali Chakinala, Michelle Cho, Robert P. Frantz, Andrew Frick, Lisa Lancaster, Scott Milligan, Ronald Oudiz, Sumeet Panjabi, Yuen Tsang **Steven D. Nathan.** Characteristics of patients with pulmonary arterial hypertension from an innovative, comprehensive real-world patient data repository. Pulm Circ. 2023 Jul 6;13(3):e12258. doi: 10.1002/pul2.12258. eCollection 2023 Jul. PMID: 37427090
169. Jürgen Behr, **Steven D. Nathan**, Ulrich Costabel, Carlo Albera, Wim A. Wuyts, Marilyn K. Glassberg, Harold Haller Jr, Giuseppe Alvaro, Frank Gilberg, Katerina Samara, Lisa Lancaster. Efficacy and safety of pirfenidone in patients with advanced versus non-advanced idiopathic pulmonary fibrosis – post-hoc analysis of six clinical studies. Adv Ther. 2023 Sep;40(9):3937-3955. doi: 10.1007/s12325-023-02565-3. Epub 2023 Jun 30. PMID: 37391667
170. Christopher S. King, Emily White, Joshua Mooney, Shambhu Aryal, Oksana A. Shlobin, Singhal, Christopher Thomas, Vikramjit Khangoora, Alan Nyquist, Kevin Flaherty, **Steven D. Nathan.** Factors Associated With Listing for Lung Transplantation in IPF Patients: An Analysis of the Pulmonary Fibrosis Foundation Registry. Accepted to Heliyon.
171. **Steven D. Nathan**, Hong T, Rao Y, Boris Medarov, Lawrence Ho, John F Kingsley, Meredith Broderick, Eric Shen, Peter Smith, Chunqin Deng. A novel approach to clinical change endpoints: a win ratio analysis of the INCREASE trial. Ann Am Thorac Soc. 2023 Oct;20(10):1537-1540. doi: 10.1513/AnnalsATS.202303-229RL. PMID: 37413676
172. Christopher S. King, Emily White, Joshua Mooney, Shambhu Aryal, Oksana A. Shlobin, Singhal, Christopher Thomas, Vikramjit Khangoora, Alan Nyquist, Kevin Flaherty, **Steven D. Nathan.** Factors Associated With Listing for Lung Transplantation in IPF Patients: An Analysis of the Pulmonary Fibrosis Foundation Registry. epub Heliyon 8/5/2023.
[https://authors.elsevier.com/sd/article/S2405-8440\(23\)05826-7](https://authors.elsevier.com/sd/article/S2405-8440(23)05826-7)
173. Shameek Gayen, Robert P. Baughman; **Steven D. Nathan**; Athol U. Wells; Vasilis Kouranos; Esam H. Alhamad; Daniel A. Culver; Joseph Barney; Eva M. Carmoma; Francis C. Cordova; Marloes Huitema; Mary Beth Scholand; Marlies Wijsenbeek; Sivagini Ganesh; Surinder S. Birring; Laura C. Price; Stephen J. Wort; Oksana A. Shlobin; Rohit Gupta. Pulmonary Hemodynamics and Transplant-Free Survival in Sarcoidosis-Associated Pulmonary Hypertension: Results from an International Registry. Pulm Circ 2023;13:e12297 <https://doi.org/10.1002/pul2.12297>

174. Paul Ford, Michael Kreuter, Kevin K. Brown, Wim A. Wuyts, Marlies Wijsenbeek, Dominique Israel-Biet, Richard Hubbard, **Steven D. Nathan**, Hilario Nunes, Bjorn Penninckx, Niyati Prasad, Ineke Seghers, Paolo Spagnolo, Nadia Verbruggen, Nik Hirani1, Juergen Behr, Robert J. Kaner, Toby M. Maher. An adjudication algorithm for respiratory-related hospitalization in idiopathic pulmonary fibrosis. Accepted ERJ Open Research 11/08/2023
175. **Steven D. Nathan**, Abhimanyu Chandel, Ya Wang, Jiawei Xu, Lixin Shao, Timothy R. Watkins, Jack Diviney, Christopher S. King, Ling Han. Derivation and validation of a non-invasive prediction tool to identify pulmonary hypertension in patients with IPF: evolution of the model FORD. J Heart Lung Transplant 2024;43:547-553 PMID: 37979926.
176. **Steven D. Nathan**, Shilpa Johri, Joanna Joly, Amresh Raina, Colleen McEvoy, Dasom Lee, Eric Shen, Peter Smith, Chunqin Deng, Aaron Waxman. Survival Analysis from the INCREASE Study in PH-ILD: Evaluating the Impact of Treatment Crossover on Overall Mortality. Thorax 2024;79:301-306.
177. Michael B. Keller, Xin Tian, Deniz Ozisik, Moon Kyoo Jang, Rohan Meda, Ananth Charya, Gerald J. Berry, Charles C. Marboe, Hyesik Kong, Ileana L. Ponor, Shambhu Aryal, Jonathan B. Orens, Pali D. Shah, **Steven D. Nathan**, Sean Agbor-Enoh. Organizing pneumonia is associated with molecular allograft injury and the development of antibody-mediated rejection. J Heart Lung Transplant. 2024;43: 563 - 570
178. Tracey Weiss, Aimee M. Near, Xiaohui Zhao, Dena Rosen Ramey, Tania Banerji, Handing Xie, Steven D. Nathan. Healthcare resource utilization in patients with pulmonary hypertension due to chronic obstructive pulmonary disease (PH-COPD): a real-world data analysis. BMC Pulm Med. 2023 Nov 21;23(1):455. doi: 10.1186/s12890-023-02698-9
179. Shanti Balasubramanian, Hyesik Kong, Sheng Fu, Jian Sun, Moon Kyoo Jang, Temesgen E. Andargie, Michael B. Keller, Woojin Park, Zainab Apalara, Neelam Redekar, Jonathan Orens, Shambhu Aryal, Errol Bush, Pali Shah, Kai Yu, **Steven D. Nathan**, Sean Agbor-Enoh. Cell-free DNA levels correlate with tissue injury and disease severity in lung transplant candidates. Am J Respir Crit Care Med. 2024 Mar 15;209(6):727-737. doi: 10.1164/rccm.202306-1064OC
180. **Steven D. Nathan**, Benham Tehrani, Qiong Zhao, Rafael Arias, Dennis Kim, Antonia Pellegrini, A. Claire Collins, Jack Diviney, Shourjo Chakravorty, Vikramjit Khangoora, Oksana A. Shlobin, Christopher Thomas, Ben R. Lavon, Christopher S. King, Abhimanyu Chandel. Pulmonary Vascular Dysfunction without Pulmonary Hypertension: A Distinct Phenotype in Idiopathic Pulmonary Fibrosis. Pulm Circ. 2024 Jan 3;14(1):e12311. doi: 10.1002/pul.2.12311. eCollection 2024 Jan. PMID: 38174158
181. Paul Ford, Michael Kreuter, Kevin K. Brown, Wim A. Wuyts, Marlies Wijsenbeek, Dominique Israel-Biet, Richard Hubbard, **Steven D. Nathan**, Hilario Nunes, Bjorn Penninckx, Niyati Prasad, Ineke Seghers, Paolo Spagnolo, Nadia Verbruggen, Nik Hirani1, Juergen Behr, Robert J. Kaner, Toby M. Maher. An adjudication algorithm for respiratory-related hospitalization in idiopathic pulmonary fibrosis. ERJ Open Research 2024; DOI: 10.1183/23120541.00636-2023

182. Keller MB, Tian X, Jang MK, Meda R, Charya A, Berry GJ, Marboe CC, Kong H, Ponor IL, **Aryal S**, Orens JB, Shah P, **Nathan SD**, Agbor-Enoh S. Higher Molecular Injury at Diagnosis of Acute Cellular Rejection Increases the Risk of Lung Allograft Failure. *Am J Respir Crit Care Med.* 2024 May 15;209(10):1238-1245. doi: 10.1164/rccm.202305-0798OC.
183. King CS, Ignacio RV MS, Khangoora V, Nyquist A, Singhal A, Thomas C, Cantres OF, Aryal S, Shlobin OA, Flaherty K, Lasky J, **Nathan SD**. Hospitalization Rates in Interstitial Lung Disease: An Analysis of the Pulmonary Fibrosis Foundation Registry. *Am J Respir Crit Care Med.* 2024 Jan 18. doi: 10.1164/rccm.202309-1708OC. Epub ahead of print. PMID: 38236191.
184. Weatherald J; **Nathan SD**; El-Kersh K; Argula R; DuBrock HM; Rischard F; Cassady S; Tarver JH III; Levine DJ; Tapson V; Deng CQ; Shen E; Das M; Waxman AB. Inhaled Treprostinil in Patients with Pulmonary Hypertension Associated with Interstitial Lung Disease with Less Severe Hemodynamics: A Post hoc Analysis of the INCREASE Study. *BMJ Open Respir Res.* 2024 Mar 22;11(1):e002116. doi: 10.1136/bmjresp-2023-002116.
185. **Steven D. Nathan**, Rahul Argula, Maria G. Trivieri, Sameh Aziz, Elizabeth Gay, Boris Medarov, Joseph Parambil, Amresh Raina, Michael G. Risbano, Thenappan Thenappan, Jose Soto Soto, Heidi Bell, Victoria Lacasse, Prakash Sista, Michael Di Marino, Aimee Smart, Brittanie Hawkes, Elizabeth Nelson, Todd Bull, Victor Tapson, Aaron Waxman. Inhaled Treprostinil in Pulmonary Hypertension Due to COPD: PERFECT study results. *Eur Respir J.* 2024 Jun 6;63(6):2400172. doi: 10.1183/13993003.00172-2024. PMID: 38811045; PMCID: PMC11154754.
186. Luca Richeldi, Jürgen Behr, Tamera J. Corte, Vincent Cottin, Gisli Jenkins, Nikhil Kamath, Yoshikazu Inoue, **Steven D. Nathan**, Ganesh Raghu, Jessie Randhawa, Simon L.F. Walsh, Fernando J. Martinez. Long-term efficacy and safety of zinpentraxin alfa (recombinant human pentraxin-2) in patients with idiopathic pulmonary fibrosis: design of the Phase III randomised, double-blind, placebo-controlled STARSCAPE trial and open-label extension study. *Am J Respir Crit Care Med.* 2024 May 1;209(9):1132-1140. doi: 10.1164/rccm.202401-0116OC. PMID: 38354066
187. Keller MB, Newman D, Alnababteh M, Ponor L, Shah P, Mathew J, Kong H, Andargie T, Park W, Charya A, Luikart H, Aryal S, **Nathan SD**, Orens JB, Khush KK, Jang M, Agbor-Enoh S. Extreme elevations of donor-derived cell-free DNA increases the risk of chronic lung allograft dysfunction and death, even without clinical manifestations of disease. *J Heart Lung Transplant.* 2024 Sep;43(9):1374-1382. doi: 10.1016/j.healun.2024.04.064. Epub 2024 May 3. PMID: 38705500.
188. Fernandez Davila JG, Moore DW, Kim J, Khan JA, Singh AK, **Nathan SD**, Rodriguez LR, Grant GM, Moran JL. Pulmonary Matrix Derived Hydrogels from Patients with Idiopathic Pulmonary Fibrosis Induce a Proinflammatory State in Lung Fibroblasts. *Mol Biol Cell.* 2024 Aug 1;35(8):ar114. doi: 10.1091/mbc.E23-11-0428. Epub 2024 Jul 10.
189. Keller MB, Sun J, Alnababteh M, Ponor L, D Shah P, Mathew J, Kong H, Charya A, Luikart H, Aryal S, **Nathan SD**, Orens JB, Khush KK, Kyoo Jang M, Agbor-Enoh S. Baseline Lung Allograft Dysfunction After Bilateral Lung Transplantation Is Associated With an Increased Risk of Death:

Results From a Multicenter Cohort Study. *Transplant Direct.* 2024 Jun 26;10(7):e1669. doi: 10.1097/TXD.0000000000001669. PMID: 38953039; PMCID: PMC11216668.

190. Weiss T, Ramey DR, Pham N, Shaikh NF, Tian D, Zhao X, Near AM, Lautsch D, **Nathan SD**. Excess healthcare resource utilization and costs for commercially insured patients with pulmonary arterial hypertension: A real-world data analysis. *Pulm Circ.* 2024 Jun 19;14(2):e12390. doi: 10.1002/pul2.12390. PMID: 38903484; PMCID: PMC11186841.
191. **Steven D. Nathan**, Victoria Lacasse, Heidi Bell, Prakash Sista, Michael Di Marino, Todd Bull, Victor Tapson, Aaron Waxman. COPD associated Pulmonary Hypertension: a post hoc analysis of the PERFECT Study. *Pulm Circ.* 2024 Oct 2;14(4):e12430
192. Christopher Choi, Peiman Lahsaei, Nicole De Simone, Christopher B Webb, Sean G Yates, Jay S Raval, Michelle S Harkins, Donald J Hillebrand, Antonio Belli, Nicolas A Slaboberski, Tina S. Ipe, Grace C Banez-Sese, Vikramjit S Khangoora, **Steven D Nathan**, Trudy M Demko, David C Young, Jason C Wells, Sigalit Caron, Ravi Sarode. Plasma Adsorption with the MTx.100 Column in Critically Ill COVID-19 PatientsA prospective EUA study and propensity score analysis. Accepted with minor revision *Journal of Intensive Care Medicine* 08/15/2024
193. **Nathan SD**, Rajicic N, Dudenhofer R, Hussain R, Argula R, Bandyopadhyay D, Luckhardt T, Muehlemann N, Flaherty KR, Glassberg MK, Lancaster L, Raghu G, Fernandes P. Inhaled Nitric Oxide in Fibrotic Lung Disease: A Randomized, Double-Blind, Placebo-Controlled Trial. *Ann Am Thorac Soc.* 2024 Aug 14. doi: 10.1513/AnnalsATS.202406-662OC. Epub ahead of print. PMID: 39141673.
194. Christopher Choi, Peiman Lahsaei, Nicole De Simone, Christopher B Webb, Sean G Yates, Jay S Raval, Michelle S Harkins, Donald J Hillebrand, Antonio Belli, Nicolas A Slaboberski, Tina S. Ipe, Grace C Banez-Sese, Vikramjit S Khangoora, **Steven D Nathan**, Trudy M Demko, David C Young, Jason C Wells, Sigalit Caron, Ravi Sarode. Plasma Adsorption with the MTx.100 Column in Critically Ill COVID-19 Patients: A prospective EUA study and propensity score analysis. *Journal of Intensive Care Medicine* 2024. <https://journals.sagepub.com/doi/10.1177/08850666241280031>
195. **Steven D. Nathan**, Juergen Behr, Vincent Cottin, Lisa Lancaster, Peter Smith, CQ Deng, Natalie Breytenbach, Heidi Bell, Leigh Peterson, Kevin R. Flaherty. Study Design and Rationale for the TETON-PPF Phase 3, Randomized, Controlled Clinical Trial of Inhaled Treprostинil in the Treatment of Progressive Pulmonary Fibrosis. Accepted to *Chest Pulmonary* 11/05/2024

In submission or preparation:

1. Carmona EM; Birring SS, Kalra S, Novotny P, Shlobin OA, Kouranos V, Alhamad EH, Culver DA, Barney J, Gupta R, Scholand MB, Wijsenbeek M, Huitema M, Ganesh S, Lower EE, Engel PJ, Wells AU, **Nathan SD**, Baughman RP. Analysis of Quality of Life for Sarcoidosis Associated Pulmonary Hypertension - from a multinational registry.
2. Charya A, Jang MK, Hamad Y, Keller MB, Fu YP, Brower R, Shah P, Mathew J, Aryal S, Kong H, Berry GJ, MArboe CC, Orens JB, **Nathan SD**, Agbor-Enoh S. Donor-derived cell-free DNA to monitor immunosuppression adequacy in lung transplantation. Submitted to *JHLT* 03/25/24

3. Consortium including **Nathan SD**. Considerations for the Implementation of a Clinical Trials Network in Pulmonary Hypertension A Pulmonary Hypertension Clinical Trial Network Interest & Feasibility Workshop Report. To be submitted to Chest.
4. Kenneth Risner, Katie V. Tieu, Yafei Wang, Allison Bakovic, Farhang Alem, Nishank Bhalla, **Steven D. Nathan**, Daniel E. Conway, Paul Macklin, Aarthi Narayanan, Farhang Alem. Maraviroc inhibits SARS-CoV-2 multiplication and s-protein mediated cell fusion. Submitted to Frontiers in Virology 11/19/2021.
5. Ananth Charya, Moon Kyoo Jang, PhD, Junfeng Sun, Cedric Mutebi,, Helen Luikart, Pali Shah, Joby Matthews, Anne W. Brown, Hyesik Kong, Ilker Tunc, Gerald Berry, Charles Marboe, Aldo Iacono, **Steven D. Nathan**, Kiran Khush, Jonathan B Orens, Hannah A. Valentine, Sean Agbor-Enoh. Racial disparities in Lung Transplant Allograft Failure and cell free DNA-assessed Allograft injury
6. Laurent Savale, Marc Humbert, Athol U Wells, **Steve D. Nathan**, Rohit Gupta, Marloes Huitema, Xavier Jaïs, Jan C. Grutters, Vasilis Kouranos, David Montani, Oksana Shlobin, Olivier Sitbon, Robert P. Baughman. Algorithm for pulmonary hypertension screening in sarcoidosis: A Delphi consensus. To be submitted to the ERJ
7. Gustaf Wigerblad, Seth Warner, Marcos J. Ramos-Benitez, Lela Kardava, Xin Tian, Rui Miao, Robert Reger, Mala Chakraborty, Susan Wong. Yogendra Kanthi, Anthony F. Suffredini, Stefania Dell'Orso, Stephen Brooks, Christopher King, Oksana Shlobin, **Steven D. Nathan**, Susan Moir, Richard W. Childs, Mariana Kaplan, Daniel S. Chertow, Jeffrey R. Strich, Spleen tyrosine kinase inhibition restores myeloid homeostasis in COVID-19.
8. Brian E. Foster, Kareem Ahmad, Scott D. Barnett, Ashley Collins, Steven D. Nathan, Sanket Meghpara, Shambhu Aryal, Anne W. Brown, Christopher King, Oksana A. Shlobin, Nargues A. Weir. Sleep Quality Association with Clinical Outcomes in Interstitial Lung Disease. To be submitted to the ERJ.
9. Sean Agbor-Enoh, Ananth V. Charya, Katrina Basemore, Ann Bon, Ileana L. Ponor, Moon K. Jang, Hyesik Kong, Pali Shah, **Steven D. Nathan**. Should Pulmonary Clinical AMR Include A Potential AMR Category?
10. Laura C Price, Vasileios Kouranos, Robert Baughman, Chloe I Bloom, Oksana Shlobin , **Steven D. Nathan**, Rohit Gupta, Colm McCabe, Chinthaka B Samaranayake, Thomas Mason, Bhashkar Mukherjee, Aimee Brame, Johnny Falconer, Catherine Taube, Ankita Sahni, Aleksander Kempny, Konstantinos Dimopoulos, Thomas Semple, Carl Harries, Athol U Wells, S John Wort. Use of Pulmonary Arterial Hypertension Therapies in patients with Sarcoid-associated Pulmonary Hypertension: Results from an International Registry. Submitted to Thorax October 11 2023
11. Shourjo Chakravorty, Ramona Raya, Oksana A. Shlobin, Christopher King, Ashima Malik, Pooja Singh, Steven D. Nathan, Shambhu Aryal Anti-MDA5 antibody dermatomyositis with rapidly progressive interstitial lung disease: Singl.e Center Experience.. Anti-MDA5 antibody dermatomyositis with rapidly progressive interstitial lung disease: Single Center Experience. To be submitted to Lung.

12. A multicellular computational model of SARS-CoV-2 infectious transmission and virion-mediated cell-cell fusion. Yafei Wang, Michael Getz, Kenneth H. Risner, Katie V. Tieu , Allison Bakovic , Nishank Bhalla , **Steven D. Nathan**, Daniel E. Conwayc, Farhang Alem , Aarthi Narayananb, Paul Macklin. To be submitted to Journal of Theoretical Biology
13. Timofte I, Kwesiga DM, Vesselinov R, Shah P, Keller M, Orens J, **Nathan SD**, Brown A, Aryal S, Pham S, Valentine H. Terrin M, Iacono A and Agbor-Enoh S. Donor-Derived Cell-Free DNA - a potential Prognostic Biomarker in Patients Severe Primary Graft Failure Requiring ECMO Support
14. El-Kersh K; Bag R; Bhatt N; King C; Waxman A; Rischard F; Kim H; Cella D; Shen E; **Nathan SD**. Derivation of a Simple Risk Calculator for Predicting Clinical Worsening in Patients with Pulmonary Hypertension Due to Interstitial Lung Disease. To be submitted to JHLT.
15. Eileen M. Harder, Pietro Nardelli, Bina Choi, Carrie L. Pistenmaa, Russell P. Bowler, Mónica Iturrioz Campo Paul M. Hassoun, Jane A. Leopold, Fernando J. Martinez, **Steven D. Nathan**, Imre Noth, Rajan Saggar, Rúben San José Estépar, Oksana A. Shlobin, Aaron B. Waxman, Rachel K. Putman, George R. Washko, Raúl San José Estépar, Farbod N. Rahaghi. Pre-acinar pulmonary arterial dilation mediates the detrimental impact of quantitative interstitial abnormalities on clinical outcomes in smokers: a mediation analysis. To be submitted to Am J Res Crit Care Med.
16. Michael B. Keller, David Newman, Muhtadi Alnababteh, Ann Bon, Lucia Ponor, Pali Shah, Joby Matthews, Hyesik Kong, Temesgen Andargie, Woojin Park, Ananth Charya, Helen Luikart, Tyler Intrieri, Shambhu Aryal, **Steven D. Nathan**, Jonathan B. Orens, Kiran K. Khush, Moon Jang, Sean Agbor-Enoh. A Molecular Criteria for Antibody Mediated Rejection in Lung Transplant Recipients is Associated with an Increased Risk of the Composite Outcome of CLAD and Death (received 03/12/24)
17. Ho Cheol Kim; Abhimanyu Chandel, Christopher S. King, Mee Jee Kim, Malek Shawabkeh, Ambalavanan Arunachalam, Rade Tomic, **Steven D. Nathan**. Performance of the FORD versus other available models for the noninvasive prediction of pulmonary hypertension in patients with interstitial lung disease. Submitted to Chest 4/29/2024
18. Kiana C. Allen, Seth Warner, Heather L. Teague, Marcos J. Ramos-Benitez, Rui Miao, Xin Tian, Robert Reger, Peter D. Burbelo, Chi Wing (Jeffrey) Peng, Yogendra Kanthi, Jeffrey I. Cohen, Anthony F. Suffredini, Christopher King, **Steven D. Nathan**, Richard W. Childs, Daniel S. Chertow, Jeffrey R. Strich. Fostamatinib Inhibits NETosis Induced by SARS-CoV-2 Spike Immune Complexes. To be submitted to JID 05/05/2024
19. C. Abecassis, J. Pastre, A. Case, D. Antin-Ozerkis, A. Shifren, R. Hindre, A. Benattia, F. Riviere, L. Wemeau, E. Libre, C. Picone, S. Johri, J. Ouaknine, J. Taverne, R. Ben-Dhiab, A. Hamdan, J. Chung, A. Dubocage, KD. Dang Tran, A. Maillard, CS. King, **SD. Nathan**. Objective Clinical Scoring System and Diagnostic Variability in Idiopathic Pulmonary Fibrosis. Submitted to ERJ 05/07/2024
20. Christopher Thomas, Abhimanyu Chandel, Mira Zineddin, Charles Tang, Vikramjit Khangoora, Christopher King, Oksana A Shlobin, **Steven D. Nathan**. The Effect of Antifibrotics on the Progression of Pulmonary Hypertension in Patients with Interstitial Lung Disease Listed for Lung Transplantation.

21. Ho Cheol Kim, Onix Cantres Fonseca, Behnam N. Tehrani, Christopher S. King, Christopher Thomas, Vikramjit Khangoora, Oksana A Shlobin, **Steven D. Nathan**. Discrepancy Between Pulmonary Arterial Wedge Pressure and Left Ventricular End Diastolic Pressure In Patients With Interstitial Lung Disease. Submitted to Chest 08/02/2024
22. **Steven D Nathan**, Shambhu Aryal, Edwinia Battle, A. Whitney Brown, Megan Harbour, Vikramjit Khangoora, Merte Lemma Woldehanna, Astrid Munoz, Alan Nyquist, Oksana A. Shlobin, Anju Singhal, Jeannie Taylor, Christopher Thomas, Jared Wilkinson, Christopher King. College Summer Student Program at an Advanced Lung Disease and Transplant Program. Submitted to ATS Scholar 08/08/2024
23. Ifan Jenkin, Konstantinos Dimopoulos, Tim Dawes, **Steven D. Nathan**, Simon Bax, Colm McCabe, Bhavin Rawal, Bhashkar Mukherjee, Vasilis Kouranos, Athol Wells, Elizabeth Renzoni, Peter George, SJ Wort, LC PriceSurvival in patients with pulmonary hypertension secondary to fibrotic interstitial lung disease is independent of ILD subtype. To be submitted to Chest as a research letter. (08/23/24)
24. Anna L. Peljto **Steven D. Nathan**, David A. Schwartz (91 authors total).Genome-wide Association study of Idiopathic Pulmonary Fibrosis in East Asian Populations. (Targert-NEJM) 08/24/24
25. Yanni Fan, Haikun Bao, Pratik Pimple, Amy L Olson, **Steven D Nathan**. Incidence rates and prevalence of idiopathic pulmonary fibrosis in the United States 2017–2022 (Target- Blue Journal) 08/26/24
26. Wendelberger B, Jensen TP, Quintana M, Stewart I, Molyneaux PL, Maher TM, Oldham JM, Johnson SR, Fahy WA, Khan F, Abdulqawi R, Allen R, Baldi BG, Chaudhuri N, Corte TJ, Cottin V, Funke-Chambour M, Glaspole I, Holland AE, Johannson KA, Khor YH, Kreuter M, Kulkarni T, Martinez FJ, Molina-Molina M, Montesi SB, **Nathan SD**, Piccari L, Rajan S, Rivera-Ortega P, Ryerson CJ, Saini G, Sakamoto K, Wain LV, Wells AW, Adams W, Kawano-Dourado L, Jenkins GR, Lewis RJ. A Statistical Model for the Integrated Assessment of Lung Function Trajectory and Mortality in Patients with Interstitial Lung Disease.

Case Reports:

1. Farina G, Rosner F, **Nathan S**, Brennessel D: Brucellosis in an 18- year old man from Greece, New York State Journal of Medicine. December 1988; 659-660.
2. **Nathan SD**, Vaghawalla R, Mohsenifar Z; Use of Nd: Yag Laser in Endobronchial Kaposi's Sarcoma. Chest 1990; 98:1299-1300.
3. Collier J. Wolfe R, Lerner R, **Nathan S**, Mohsenifar Z: Spinal Aspergillus in a Patient with Bronchocentric Granulomatosis. Journal of Intensive Care Medicine. 1995;10:45-8
4. **Nathan SD**, LoRusso T, Roberts P, Pfundstein J, Burton N. Endobronchial CMV in a Lung Transplant Recipient. Journal of Bronchology 1999; 6:29-31

5. Meyers J, Shabshab S, Burton N, **Nathan S.** Successful use of Cyclosporine in a Lung Transplant Recipient with Tacrolimus-Associated Hemolytic Uremic Syndrome. *J Heart Lung Transplant* 1999; 18:1024-1026 .
6. Douglas F, **Nathan SD**, Ahmad S, Myers J, DiStefano D, Massamiano P, Lefrak E, Burton N. Successful Lung Transplantation from a Donor with a Saddle Pulmonary Embolus. *J Heart Lung Transplant* 2005; 24:1137-9
7. Deb S, Yun J, Burton N, Omron E, Thurber J, **Nathan SD**. Reversal of Idiopathic Pulmonary Arterial Hypertension and Allograft Pneumonectomy After Single Lung Transplantation. *Chest* 2006; 130: 214 – 217
8. Woodrow J, **Nathan SD**, Shlobin OA. Idiopathic Nonspecific Interstitial Pneumonitis responsive to Transplant associated Immunosuppression. *J Heart Lung Transplant* 2011;30:358-9.
9. Cohee B, Shlobin O, Mani H, Brown A, Khandhar S, Fregoso M, Germano K, **Nathan S**, Ahmad S. Adenovirus Infection Presenting as a Solitary Mass Lesion with Lymphocytic Effusion in a Lung Transplant Recipient. Submitted to Chest
10. Warren, Whittney; Franco-Palacios, Domingo; King, Christopher; Shlobin, Oksana; **Nathan, Steven**; Katugaha, Shalika; Mani, Haresh; Brown, A Opportunistic Infection by a Very Unusual Fungus in a Cystic Fibrosis Patient. submitted to Chest April 2nd, 2017.
11. Warren WA, Franco-Palacios D, King CS, Shlobin OA, **Nathan SD**, Katugaha S, Mani H, Brown AW. A 24-year-old Woman with Precipitous Respiratory Failure Requiring Lung Transplantation. *Chest* 2018;153:e53-e56
12. McMahon M, Aryal S, **Nathan SD**. Severe Pulmonary Hypertension in a Patient with Pyruvate Kinase Deficiency Treated with Riociguat. To be submitted to *J Heart Lung Transplant*
13. Koslow M, Bennji SM, Griffiths-Richards S, Ahmad K, Johnson GB, Ryu JH, **Nathan SD**, Allwood BW. A 48-year-old South African Woman with Rheumatoid Arthritis and Lung Nodules. *Chest* 2020;157:e151-e155
14. Burn Pits-Associated, Long-term Iraq/Afghanistan War Lung Injury (IAW-LI). Submitted to Mayo Clinic Proceedings.
15. Mabe D, Shlobin OA, Bogar, L, **Nathan SD**, Brown AW, Ahmad K, Aryal S, Murphy C, King CS. ECMO as a Bridge to Initial Medical Therapy in a Patient with Decompensated Pulmonary Arterial Hypertension. *Journal of Medical Cases*. Accepted Aug 27th 2019.
16. Shalika Katugaha, Oksana Shlobin, Chris King, **Steve Nathan**, Shambu Aryal, Kareem Ahmad, Whitney Brown. Donor Derived Strongyloidiasis: Life Cycle to Hyperinfection Syndrome. *OBM Transplantation* <https://www.lidse.com/journals/transplantation,ISSN2577-5820>
17. Haynes Z, Aryal S, Nyquist A, **Nathan SD**. A Young Male with Spontaneous Pneumothorax and Pulmonary Cysts. To be submitted to the NEJM.

Reviews:

1. Fairman RP, **Nathan SD**. The Changing Indications for Lung Transplantation, Virginia Thoracic Journal 1995; 2; 1:1-4
2. **Nathan SD**, Fairman RP. Who is an Appropriate Candidate for Lung Transplantation? Federal Practitioner 1996; 13:11:43-49
3. **Nathan SD**. Lung Transplantation: Disease Specific Considerations. Chest 2005 127: 1006-1016
4. **Nathan S**. Lung Transplant Candidate Selection and Clinical Outcomes: Strategies for Improvement in Prioritization. Current Opinions in Organ Transplantation 2005;10:216-220
5. **Nathan SD**. Management of Idiopathic Pulmonary Fibrosis: Assessing the Role of the International Consensus Guidelines. Chest 2005;128:533-539S
6. **Nathan SD**. Therapeutic management of Idiopathic Pulmonary Fibrosis: An Evidence-Based Approach. Clinics in Chest Medicine 2006;27:S27-35
7. **Nathan SD**, Noble P, Tuder R. Idiopathic Pulmonary Fibrosis and Pulmonary Hypertension: connecting the dots. Am J Respir Crit Care Med 2007;175:875-880
8. **Nathan SD**. Pulmonary Hypertension in Interstitial lung Disease. Int J Clin Pract Suppl. 2008;160:21-8.
9. Nations JA, **Nathan SD**. Pharmacologic and Surgical therapy for Diffuse Parenchymal Lung Diseases. Respiratory Therapy for Decision Makers in Respiratory Care November 2007.
10. Nations JA, **Nathan SD**. Comorbidities of Advanced Lung Disease. Mt Sinai J Med. 2009 76:53-62
11. Chhina M, Shlobin OA, Grant G, **Nathan SD**. Gleevec for IPF. Expert Review of Respiratory Medicine 2008 2;419-431.
12. Nations JA, **Nathan SD**. Pulmonary Hypertension in Interstitial Lung Disease. Clinical Pulmonary Medicine 2009;16:252-257
13. Chhina M, Weir N, Grant G, **Nathan SD**. Evaluation of Imatinib Mesylate in the treatment of pulmonary arterial hypertension. Future Cardiology 2010;6:19-35.
14. **Nathan SD**. IPF and Pulmonary Hypertension: A Review.
http://www.chestnet.org/education/online/pccu/vol23/lessons23_24/index.php December 2009.
15. Ahmad S, Shlobin, OA, **Nathan SD**. Pulmonary Complications of Lung Transplantation. Chest 2011;139:402-411
16. Shlobin OA, **Nathan SD**. Pulmonary Hypertension secondary to Interstitial Lung Disease. Expert Rev. Resp. Med 2011;5:179-189

17. Shlobin OA, **Nathan SD**. Management of End-Stage Sarcoidosis: Pulmonary Hypertension and Lung Transplantation. *Eur Respir J* 2012;39:1520-1533
18. **Nathan SD**, Cottin V. Pulmonary hypertension in patients with idiopathic pulmonary fibrosis. *Eur Respir Mono* 2012;57:1-13.
19. Sherner J, Collen J, King CS, **Nathan SD**. Pulmonary Hypertension in Idiopathic Pulmonary Fibrosis: Epidemiology, Diagnosis and Therapeutic Implications. *Curr Respir Care Rep* 7/9/2012 DOI 10.1007/s13665-012-0027-8
20. Idiopathic Pulmonary Fibrosis: Lung Function is a Clinically Meaningful Endpoint for Phase 3 Trials. Du Bois RM, **Nathan SD**, Richeldi L, Schwartz M, Noble PN. *Am J Respir Crit Care Med* 2012;186:712-715
21. King C, **Nathan SD**. Identification and treatment of comorbidities in idiopathic pulmonary fibrosis and other fibrotic lung disease. *Curr Opin Pulm Med* 2013;19:466-473
22. Hostler J, Brown AW Sherner J, King CS, **Nathan SD**. Pulmonary Hypertension in COPD: A Review. *Eur Respir Monograph* 2013;59:189-205
23. Boyden JY, Connor SR, Otolorin L, **Nathan SD**, Scheffey C, Banks S, Fine P, Davis M, Muir JC. Inhaled Medications for the Treatment of Dyspnea: A Literature Review. *J Aerosol Med Pulm Drug Deliv*. 2015;28:1-19
24. Cottin V, **Nathan SD**. Hypertension pulmonaire au cours de la fibrose pulmonaire idiopathique. *Pneumologie* 2013. [http://dx.doi.org/10.1016/S1155-195X\(13\)61187-1](http://dx.doi.org/10.1016/S1155-195X(13)61187-1)
25. **Nathan SD**, Hassoun PM. Pulmonary Hypertension and Hypoxia in Parenchymal Lung Disease. *Clin Chest Med*. 2013 Dec;34(4):695-705. doi: 10.1016/j.ccm.2013.08.004
26. **Nathan SD**, Meyer KC. IPF Clinical Trial design and Endpoints. *Curr Opin Pulm Med*. 2014 Sep; 20(5):463-71.
27. **Nathan SD**, King C. Current and Emerging Therapeutic Targets for Pulmonary Hypertension in Idiopathic Pulmonary Fibrosis. *Drug Des Devel Ther*. 2014 Jul 2;8:875-85. doi: 10.2147/DDDT.S64907
28. **Nathan SD**. The Future of Lung Transplantation. *Chest* 2015;147:309-316
29. Meyer KC, Danoff S, Lancaster L, **Nathan SD**. Management of Idiopathic Pulmonary Fibrosis in the Elderly Patient: Addressing Key Questions. *Chest* 2015;148:242-252
30. Baughman RP, Engel PJ, **Nathan SD**. Pulmonary hypertension in sarcoidosis. *Clin Chest Med* 2015;36:703-714.
31. King CS, **Nathan SD**. Practical Considerations in the Pharmacologic Treatment of Idiopathic Pulmonary Fibrosis. *Curr Opin Pulm Med* 2015;21:479-489

32. Brown AW, Kaya H, **Nathan SD**. Lung Transplantation in Interstitial Idiopathic Pneumonia: A Review. *Respirology* 2016;21:1173–1184.
33. Benza R, Mathai S, **Nathan SD**. sGC Stimulators: Evidence for Riociguat Beyond Groups I and IV Pulmonary Hypertension. *Respir Med*. 2016 Nov 14. pii: S0954-6111(16)30298-0. doi: 10.1016/j.rmed.2016.11.010.
34. **Nathan SD**, Behr J, Cottin V, Collard HR, Hoeper MM, Martinez FJ, Well AU. Idiopathic interstitial pneumonia-associated pulmonary hypertension: A target for therapy? *Respir Med*. 2016 Nov 5. pii: S0954-6111(16)30291-8. doi: 10.1016/j.rmed.2016.11.003.
35. Anderson A, Shifren A, **Nathan SD**. A safety evaluation of pirfenidone for the treatment of idiopathic pulmonary fibrosis. *Expert Opin Drug Saf*. 2016 Jul;15(7):975-982.
36. Shlobin OA, Brown AW, **Nathan SD**. Pulmonary Hypertension in Diffuse Parenchymal Lung Diseases. *Chest*. 2017;151(1):204-214. doi:10.1016/j.chest.2016.08.002
37. King CS, **Nathan SD**. Idiopathic Pulmonary Fibrosis: Impact and Optimal Management of Comorbidities. *Lancet Respir Med*. 2017 Jan;5(1):72-84. doi: 10.1016/S2213-2600(16)30222-3. Review
38. Muhan AK, Folch E, Khandhar SJ, Channick CL, Santacruz JF, Mehta AC, **Nathan SD**. Airway complications following lung transplantation. *Chest*. 2017 Sep;152(3):627-638.
39. El-Chemaly S, O'Brien KJ, **Nathan SD**, Weinhouse GL, Goldberg HJ, Connors JM, Cui Y, Astor TL, Camp PC, Rosas IO, WoldeHanna ML, Speransky V, Merideth MA, Gahl WA, Gochuico BR. Clinical management and outcomes of patients with Hermansky-Pudlak syndrome pulmonary fibrosis evaluated for lung transplantation. *PLoS One*. 2018 Mar 16;13(3):e0194193. doi: 10.1371/journal.pone.0194193. eCollection 2018.
40. Lancaster LH, de Andrade JA, Zibrak JD, Padilla ML, Albera C, **Nathan SD**, Wijsenbeek MS, Stauffer JL, Kirchgaessner K, Costabel¹ U. Pirfenidone Safety and Adverse Event Management: Experience From Randomized Clinical Trials and Real-World Observations in Idiopathic Pulmonary Fibrosis. *Eur Respir Rev*. 2017 Dec 6;26(146).
41. **Nathan SD**, Martinez FJ. Pitfalls in developing new compounds for IPF. *Curr Opin Pulm Med* 2017, 23:426–431.
42. **Nathan SD**. Evaluating New Treatment Options (for IPF): *Am J Managed Care* 2017;23:S139-146.
43. Brown AW, **Nathan SD**. The Value and Application of the Six Minute Walk Test in Idiopathic Pulmonary Fibrosis. *Ann Am Thorac Soc*. 2018 Jan;15(1):3-10.
44. Benza R, Raina A, Kanwar MK, **Nathan SD**, Mathai SC. sGC stimulators: evidence in pulmonary hypertension and beyond. accepted to the *Journal of Rare Diseases Research and Treatment* 11/2/17.

45. Aryal S, **Nathan SD**. An Update on Emerging Drugs for the Treatment of Idiopathic Pulmonary Fibrosis. Expert Opinion on Emerging Drugs. Expert Opin Emerg Drugs. 2018 Jun;23(2):159-172. doi: 10.1080/14728214.2018.1471465.
46. Aryal S, **Nathan SD**. Single vs Bilateral Lung Transplantation: When and Why. Curr Opin Organ Transplant. 2018 Jun;23(3):316-323. doi: 10.1097/MOT.0000000000000527.
47. Ahmad K, **Nathan SD**. Novel management strategies for idiopathic pulmonary fibrosis. Expert Rev Respir Med. 2018 Oct;12:831-842
48. Aryal S, **Nathan SD**. Contemporary Optimized Practice in the Management of Pulmonary Sarcoidosis. Ther Adv Respir Dis 2019;13:1753466619868935
49. King CS, **Nathan SD**. Pulmonary Hypertension Due to Interstitial Lung Disease. Curr Opin Pulm Med. 2019;25:459-467
50. Lancaster L, Fieuw A, Meulemans J, Ford P, **Nathan SD**. Standardization of the 6-minute walk test in idiopathic pulmonary fibrosis. Contemp Clin Trials. 2021 Jan;100:106227. doi: 10.1016/j.cct.2020.106227.
51. Harari S, Wells AU, Wuyts WA, **Nathan SD**, Kirchgaessner K, Bengus M, Behr J. The 6-min walk test as a primary end-point in interstitial lung disease. Eur Respir Rev 2022; 31: 220087 [DOI: 10.1183/16000617.0087-2022]
52. **Steven D. Nathan**, Jack Wanger, Joseph D. Zibrak, Mark L. Wencel, Cindy Burg, John L. Stauffer Using Forced Vital Capacity to Monitor Patients With Idiopathic Pulmonary Fibrosis in the Clinic: Pros and Cons. Expert Rev Respir Med. 2020 Sep 28:1-7. doi: 10.1080/17476348.2020.1816831.
53. Ahmad K, Khangoora V, Nathan SD. Lung Disease Related Pulmonary Hypertension. Cardiol Clin. 2022 Feb;40(1):77-88. doi: 10.1016/j.ccl.2021.08.005. PMID: 34809919
54. Jürgen Behr and **Steven D. Nathan**. Pulmonary Hypertension in ILD: screening, diagnosis and treatment. Curr Opin Pulm Med. 2021 Sep 1;27(5):396-404. doi: 10.1097/MCP.0000000000000790. PMID: 34127619
55. King CS, Mannem H, Kukreja J, Aryal S, Tang D, Singer JP, Bharat A, Behr J, **Nathan SD**. Lung Transplantation of COVID-19 patients: How I do it. Chest. 2022 Jan;161(1):169-178. doi: 10.1016/j.chest.2021.08.041. Epub 2021 Aug 19.
56. Sergio Harari, Athol U. Wells, Wim A. Wuyts, **Steven D. Nathan**, Klaus-Uwe Kirchgaessner, Monica Bengus Jürgen Behr. Selective use of the six-minute walk test as a primary endpoint in interstitial lung disease clinical trials. accepted to European Respiratory Review.
57. Maher TM, Schiffman C, Kreuter M, Moor CC, **Nathan SD**, Axmann J, Belloni P, Bengus M, Gilberg F, Kirchgaessner KU, Wijsenbeek MS. A review of the challenges, learnings and future directions of home handheld spirometry in interstitial lung disease. Respir Res. 2022 Nov 11;23(1):307. doi: 10.1186/s12931-022-02221-4. PMID: 36369156; PMCID: PMC9651119.

58. Steven D. Nathan, Juergen Behr, Vincent Cottin, Lisa Lancaster, Peter Smith, CQ Deng, Natalie Pearce, Heidi Bell, Leigh Peterson, Kevin Flaherty. Study Design and Rationale for the TETON Phase 3, Randomized, Controlled Clinical Trials of Inhaled Treprostинil in the Treatment of Idiopathic Pulmonary Fibrosis. Accepted to BMJ Open Resp Res 06/17/2022
59. Kolb M Orfanos S, Lambers C, Flaherty K, Masters A, Lancaster L, Silverstein A, **Nathan SD**. The antifibrotic effects of inhaled Treprostинil. Adv Ther. 2022 Jul 3. doi: 10.1007/s12325-022-02229-8.
60. Aaron Yarlas, Stephen C. Mathai, **Steven D. Nathan**, Hilary M. DuBrock, Kellie Morland, Natalie Anderson, Mark Kosinski, Xiaochen Lin, Peter Classi. Considerations when Selecting Patient-Reported Outcome Measures for Assessment of Health-Related Quality of Life in Patients with Pulmonary Hypertension: A Systematic Review. Chest. 2022 Aug 20:S0012-3692(22)03649-2. doi: 10.1016/j.chest.2022.08.2206. Online ahead of print. PMID: 35998707
61. Harrison W Farber, Lisa Lancaster, Ronald Oudiz, Robert P. Frantz, Murali Chakinala, Michelle Cho, Sumeet Panjabi, Yuen Tsang, Andrew Frick, Scott Milligan, **Steven D. Nathan**. Characteristics of patients with pulmonary arterial hypertension from an innovative, comprehensive real-world patient data repository. In development-2nd draft Aug 2022
62. Luca Richeldi, Jürgen Behr, Tamara J Corte, Vincent Cottin, Gisli Jenkins, Nikhil Kamath, Yoshikazu Inoue, **Steven D Nathan**, Ganesh Raghu, Jessie Randhawa, Simon L F Walsh, Fernando J Martinez. Long-term efficacy and safety of zinpentraxin alfa in patients with idiopathic pulmonary fibrosis: design of the Phase III randomised, double-blind, placebo-controlled STARSCAPE trial and open-label extension study. Submitted to BMJ Open Respiratory Research 11/10/2022
63. Karen M Olsson, Tamara J Corte, Jan C Kamp, David Montani, **Steven D Nathan**, Lavinia Neubert, Laura C Price, David G Kiely. Pulmonary hypertension associated with lung disease. In revision. Lancet Resp Med.
64. **Steven D. Nathan**. Progress in the Treatment of Pulmonary Hypertension associated with Interstitial Lung Disease. Am J Res and Crit Care Med 2023;208:238-246
65. Onix Cantres-Fonseca, Shambhu Aryal2, Christopher King, **Steven D. Nathan**. Chronic Lung Allograft Dysfunction, a Review in 2023. Submitted to OBM Transplantation
66. **Nathan SD**, Lee JS. Real-World Data on the Course of Idiopathic Pulmonary Fibrosis. Am J Manag Care. 2024;30:S107-S113
67. Shelsey W. Johnson, Emily S. Wan, Raul San Jose Estepar, Pietro Nardelli, Carrie Pistenmaa, Lucilla Piccari, **Steven D. Nathan**, Aaron B. Waxman, George R. Washko, Farbod N. Rahaghi Imaging to Improve Phenotyping in Pulmonary Hypertension associated with Chronic Obstructive Pulmonary Disease. Accepted to the ERJ.

Consensus Statements:

1. John H. Newman, Stuart Rich, Steven H. Abman, John H. Alexander, John Barnard, Gerald J. Beck, Raymond L. Benza, Todd M. Bull, Stephen Y. Chan, Hyung J. Chun, Declan Doogan, Jocelyn Dupuis, Scott S. Emerson, Serpil C. Erzurum, Robert P. Frantz, Mark Geraci, Hunter Gillies, Mark Gladwin, Michael P. Gray, Anna Hemnes, Roy S. Herbst, Adrian F. Hernandez, Nicholas S. Hill, Evelyn M. Horn, Kendall Hunter, Zhi-Cheng Jing, Roger Johns, Sanjay Kaul, Steven Kawut, Tim Lahm, Jane A. Leopold, Greg D. Lewis, Stephen C. Mathai, Vallerie V. McLaughlin, Evangelos D. Michelakis, **Steven D. Nathan**, William Nichols, Grier Page, Marlene Rabinovitch, Jonathan Rich, Franz Rischard, Sharon Rounds, Sanjiv J. Shah, Victor F. Tapson, Naomi Lowy, Norman Stockbridge, Gail Weinmann, Lei Xiao. Enhancing Treatments for Pulmonary Vascular Diseases (PVD) Through Precision Medicine. A Joint NHLBI-CMREF Workshop Report. Am J Respir Crit Care Med 2017; 195:1661-1670
2. Wells AU, Poletti V, Behr J, Cassidy N, Costable U, Cottin V, Hansell DM, Masefield SC, Richeldi L, Ross D, Ancochea J, Antoniou KM, Bajwah S, Bouros D, Brown KK, Collard HR, Corte TJ, Crestani B, Dai H, Drent M, Egan JJ, Fell CD, Fischer A, Flaherty KR, Grutters JC, Hirani N, Inoue Y, Maher TM, Muller-Quernheim J, **Nathan SD**, Noble PW, Powell P, Robalo-Cordeiro C, Ryerson CJ, Ryu JH, Saltini C, Selman M, Sverzellati N, Taniguchi H, Undurraga A, Valeyre D, Vancheri C, Wuyts W, Xaubet A. Diagnosis and management of idiopathic pulmonary fibrosis - a combined physician and patient European Respiratory Society and European Lung Foundation consensus statement. Accepted Eur Res J May 14th, 2018
3. **Nathan SD**, Barbera JA, Gaine SP, Harari S, Martinez FJ, Olschewski H, Olsson KM, Peacock AJ, Pepke-Zaba J, Provencher S, Weissmann N, Seeger W. Pulmonary Hypertension in Chronic Lung Disease. Eur Respir J 2019; 53: 1801914 doi: 10.1183/13993003.01914-2018
4. Savale L, Huitema M, Shlobin O, Kouranos V, Wells AU, Humbert M, **Nathan SD**, Nunes H, Gupta R, Grutters JC, Culver D, Post MC, Oullette D, Lower EE, Baughman RP. Statement on the Diagnosis and Management of Sarcoidosis-Associated Pulmonary Hypertension. Eur Respir Rev 2022; 31: 210165 [DOI: 10.1183/16000617.0165-2021].
5. Vincent Cottin, Sara Tomassetti, Claudia Valenzuela, Simon Walsh, Katerina Antoniou, Francesco Bonella, Kevin Brown, Harold Collard, Tamera J Corte, Kevin Flaherty, Kerri Johannson, Martin Kolb, Michael Kreuter, Yoshikazu Inoue, Gisli Jenkins, Joyce Lee, David Lynch, Toby Maher, Fernando Martinez, Maria Molina Molina, Jeff Myers, **Steven D Nathan**, Venerino Poletti, Sylvia Quadrelli, Ganesh Raghu, Claudia Ravaglia, Sujeet Rajan, Martine Remy-Jardin, Elisabetta Renzoni, Luca Richeldi, Paolo Spagnolo, Lauren Troy, Marlies Wijsenbeek, Kevin Wilson, Wim Wuyts, Athol U Wells, Christopher Ryerson. Integrating clinical probability into the diagnostic approach to idiopathic pulmonary fibrosis : An international working group perspective. Am J Respir Crit Care Med. 2022 Aug 1;206(3):247-259. doi: 10.1164/rccm.202111-2607PP
6. Sylvia M. Nikkho, Manuel J. Richter, Eric Shen, Steven H. Abman, Katerina Antoniou, Jonathan Chung, Peter Fernandes, Paul Hassoun, Howard M. Lazarus, Horst Olschewski, Lucilla Piccari, Mitchell Psotka, Rajan Saggar, Oksana Shlobin, Norman Stockbridge, Patrizio Vitulo, Carmine Dario Vizza, S. John Wort, and **Steven D. Nathan**. Clinical significance of pulmonary hypertension in interstitial lung disease: A Consensus Statement from The Pulmonary Vascular Research Institute's Innovative Drug Development Initiative - Group 3 Pulmonary Hypertension. Pulmonary Circulation. 2022;12:e12127. <https://doi.org/10.1002/pul2.12127>.
7. **Steven D. Nathan**, Peter Fernandes, Mitchell Psotka, Patrizio Vitulo, Lucilla Piccari, Katerina Antoniou, Sylvia Nikkho, Norman Stockbridge. Pulmonary hypertension in interstitial lung disease: clinical trials design and endpoints: A Consensus Statement from The Pulmonary Vascular Research Institute's Innovative Drug Development Initiative - Group 3 Pulmonary Hypertension. Pulm Circ. 2022 Oct 1;12(4):e12178. doi: 10.1002/pul2.12178. eCollection 2022 Oct.

8. Shlobin OA, Shen E, Piccari L, Scandurra J, Hassoun PM, Wort S, Nikko SM, **Nathan SD**. Pulmonary Hypertension in the Setting of Interstitial Lung Disease: Approach to Management and Treatment. *Pulm Circ.* 2024 Jan 10;14(1):e12310. doi: 10.1002/pul2.12310. eCollection 2024 Jan. PMID: 38205098
9. Piccari L, Allwood B, Antoniou K, Chung JH, Hassoun PM, Nikkho SM, Saggar R, Shlobin OA, Vitulo P, **Nathan SD**, Wort SJ. Pathogenesis, clinical features, and phenotypes of pulmonary hypertension associated with interstitial lung disease: a consensus statement from the Pulmonary Vascular Research Institute's Innovative Drug Development Initiative - Group 3 Pulmonary Hypertension. *Pulm Circ.* 2023;13:e12213. <https://doi.org/10.1002/pul2.12213>
10. Vitulo P, Piccari L, Wort SJ, Shlobin OA, Kovacs G, Vizza CD, Hassoun PM, Olschewski H, Girgis R, Nikkho S, Nathan SD. Screening and diagnosis of Pulmonary Hypertension Associated with chronic lung disease (PH-CLD). A Consensus Statement from The Pulmonary Vascular Research Institute's Innovative Drug Development Initiative - Group 3 Pulmonary Hypertension. To be submitted to *Pulm Circulation* 06/21/2024
11. Franck F Rahaghi, Marc Humbert, Marius M Hoeper , Robert P Frantz, Paul Hassoun, Anna R Hemnes, Steve Kawut, Valerie V McLaughlin, Gergely Meszaros, Peter Mol, **Steven D. Nathan**, Krishna Prasad, Mitch Psotka, Farbod N Rahaghi, Olivier Sitbon, Norman L Stockbridge, Jason Weatherald, R James White, Faiez Zannad, Sandeep Sahay. Defining a disease modifying agent in pulmonary arterial hypertension. To be submitted to *Lancet Res Med* 11/20/23.

Letters:

1. **Nathan SD**, Glauser FL. Pulse Oximetry Monitoring: Blinded by the Light, Lulled by the Beeps. *Annals of Emergency Medicine* 1995;26:5:661
2. **Nathan SD**, Barnett SD. Idiopathic Pulmonary Fibrosis in Transplantation. *Chest* 2003;124;6:2404
3. Egan TM, Shorr AF, **Nathan S**. Orthotopic Lung Transplant for Sarcoidosis. *Chest* 2003;123:962-63
4. Grinnan DC, Fairman P, Pinson J, **Nathan SD**. Recurrence of Severe Pulmonary Hypertension Following the Removal of a Lung Allograft. *Chest Dec 2007:* 2057–2058
5. Eberlein M, Robert R, Bölkbas S, **Nathan S**, Brower R. Response to letter, Concerns raised by lung size-mismatched transplantation. *Chest* 2012;142:543-543
6. **Nathan SD**, Brown AW, Weir N. Response to letter Six minute walk distance-effect of instructions. *Chest* 2014;145:1440-1441
7. Raghu G, Colby T, Myers J, Steele M, Benzaquen, Sadia ; Calero, Karel; Case, Amy; Criner, Gerard; **Nathan, Steven**; Rai, Navdeep; Hagmeyer, Lars; Davis, John; Bhorade, Sangeeta; kennedy, giulia; Gauhar, Umair; Martinez F. A molecular classifier that identifies usual interstitial pneumonia in transbronchial biopsies of patients with ILD. Accepted to *Chest* 10/4/2019
8. **Nathan SD**, Waxman A, Tapson V. The INCREASE Study: author response to letters to the editor. *Engl J Med* 2021 384;1869-1872
9. **Nathan SD**. Inhaled Treprostinil after Initial Clinical Worsening: To Continue or Not to Continue, That's the Question. Reponse letter. *Am J Respir Crit Care Med.* 2022 May 15;205(10):1251-1252.

doi: 10.1164/rccm.202201-0081LE. PMID: 35353003

10. Amisha V. Barochia, Scott D. Barnett, Nargues Weir, Stewart J. Levine, **Steven D. Nathan**. Reply: Not all HDL particles are equal in idiopathic pulmonary fibrosis. European Respiratory Journal 2022 59: 2200151; DOI: 10.1183/13993003.00151-2022
11. El-Kersh K, **Nathan SD**. Categorizing pulmonary hypertension: the conundrum of the continuum. Lancet Respir Med. 2022 Oct;10(10):e88. doi: 10.1016/S2213-2600(22)00304-6. PMID: 36179741
12. **Nathan SD**, Waxman A. Response to CHEST letter titled: Treprostinil and clinic outcome in pulmonary hypertension and interstitial lung disease: Is all clear? Chest 2023 164:e22
13. **Nathan SD**. Circulating Respiratory Airborne Particles: any kind of “CRAP” is bad for the lungs. Submitted to JAMA IM 11/20/22
14. **Nathan SD**, Shen E, Deng CQ. Response to letter titled: Is higher dose of inhaled Treprostinil truly superior to lower dose of inhaled Treprostinil in patients with pulmonary hypertension associated with interstitial lung diseases? Nathan SD, Shen E, Deng CQ. CHEST 2024;165:e162
15. **Nathan SD**, Kim HC, Chandel A. Response to letter from Zisman et al. on the FORD score. JHLT

Editorials:

1. **Nathan S**, Barnett S. Telesupport: Just Reach Out and Touch Someone. Chest 2002. 122:1114-1116
2. **Nathan SD**, du Bois RM. IPF trials: recommendations for the jury. Eur Respir J 2011;38:1-3
3. **Nathan SD**. Pulmonary hypertension complicating Pulmonary Fibrosis: bad and ugly, but good to treat? Thorax 2014;69:107-108
4. **Nathan SD**. Hypersensitivity pneumonitis and pulmonary hypertension-how the breeze affects the squeeze. Eur Respir 2014;44:287-288
5. **Nathan SD**, Carbone R. Bosentan in pulmonary hypertension due to fibrotic idiopathic interstitial pneumonia: Hidden value in a neutral trial. Am J Res Crit Care Med 2014;190:131-132
6. **Nathan SD**. King CS. Organ donors: Making the most of what is offered. Chest. 2015 Aug 1;148(2):303-5.
7. **Nathan SD**, Corris PA. Upfront combination therapy: does the Ambition study herald a new era in the treatment of pulmonary arterial hypertension. Thorax 2016;71:107-109 doi:10.1136/thoraxjnl-2015-207854
8. King CS, **Nathan SD**. “Should all patients with IPF, even those with more than moderate impairment, be treated with nintedanib or pirfenidone?” YES. Chest. 2016;150(2):273-275

9. Hassoun P, **Nathan SD**. Sildenafil for pulmonary hypertension complicating IPF: a rationale grounded in basic science. *Eur Respir J*. 2016 Jun;47(6):1615-7. doi: 10.1183/13993003.00395-2016.
10. **Nathan SD**. Antacid therapy and IPF: cause for heartburn? *Lancet Respir Med*. 2016 Mar 31. pii: S2213-2600(16)00102-8. doi: 10.1016/S2213-2600(16)00102-8
11. Maher TM, **Nathan SD**. Survival in IPF: perspectives from pulmonary arterial hypertension. *J Manag Care Spec Pharm*. 2017;23(3-b):S3-S4.
12. **Nathan SD**. Nintedanib and sildenafil in patients with idiopathic pulmonary fibrosis: echoes of the past, lessons for the future. *Am J Respir Crit Care Med* 2019;200:1459-1461
13. **Nathan SD**. POINT: Should every patient with IPF be referred for transplant evaluation? Yes. *Chest*. 2020 Jun;157(6):1411-1412. doi: 10.1016/j.chest.2019.12.033.
Nathan SD. Rebuttal. *Chest*. 2020 Jun;157(6):1415. doi: 10.1016/j.chest.2019.12.032
14. Aryal S, **Nathan SD**. Lung Transplantation in China: a firm foundation for a solid future. *Ann Transl Med* 2020;8:41.
15. **Nathan SD**. IPF in Saudi Arabia: lessons for all. *Nathan SD*. *Ann Thorac Med* 2020;15:183-4.
16. Chandel A, **Nathan SD**. Piecing together the bigger picture: Idiopathic pulmonary fibrosis in Australia and beyond. *Respirology*. 2022 Jan 17. doi: 10.1111/resp.14209. Online ahead of print. PMID: 35037339

Monographs

1. **Nathan SD**. IPF comorbidities. Pilot Initiative (Pulmonary Fibrosis Identification Lessons for Optimizing Treatment). Winter 2004
2. **Nathan SD**. IPF: Update on experimental therapies and current clinical trials. Pilot Initiative (Pulmonary Fibrosis Identification Lessons for Optimizing Treatment). Winter 2005
3. **Nathan SD**. IPF Updates Monograph Series: Lung Transplant. Pilot Initiative (Pulmonary Fibrosis Identification Lessons for Optimizing Treatment). December 2009
4. **Nathan S**, Mills R. New therapy options for the treatment of idiopathic pulmonary fibrosis. *Magellan Rx Report* Fall 2015:33-37

Book Chapters:

1. **Nathan S**, Ohler L. Lung and Heart-Lung Transplantation. *Solid Organ Transplantation: A Handbook for Primary Health Care Providers*. Springer Publishing Company 2002
2. **Nathan SD**, Lynch J, Ross D. Transplantation and Interstitial Lung Disease. *Lung and Heart-Lung Transplantation, for Lung Health and Biology in Disease*, Marcel Dekker, Inc. 2005

3. **Nathan SD**, Stoller JK. Alpha-1 antitrypsin Deficiency and the Liver. Clinician's Guide to Common Liver Diseases. Published Cambridge Press. 2008
4. Shlobin OA, **Nathan SD**. Lung transplantation. In Pulmonary Rehabilitation: Guidelines to Success, 4th edition (edited by Hodgkin JE, Celli BR, Connors GA). Mosby Elsevier 2008
5. Shlobin OA, **Nathan SD**. Interstitial lung disease and pulmonary hypertension. (edited by Robert Baughman, MD and Ronald du Bois, MD)
6. Collen JF, **Nathan SD**. Pulmonary Hypertension complicating underlying Lung Disease. (edited by Namita Sood).
7. Brown AW, **Nathan SD**. Making a Confident Diagnosis of Obliterative Bronchiolitis. Bronchiolitis Obliterans Syndrome in Lung Transplantation Series: [Respiratory Medicine](#), Vol. 8. Meyer, Keith C.; Glanville, Allan R. (Eds.) 2013.
8. **Nathan SD**. IPF Phenotypes. Idiopathic Pulmonary Fibrosis (edited by Meyer and **Nathan**). Published by Springer 10/9/2013
9. Shlobin OA, **Nathan SD**. Sarcoidosis associated pulmonary hypertension. Pulmonary Sarcoidosis: A Guide for the Practicing Clinician. Springer Science+Business Media 2014. Edited by Marc Judson.
10. King CS, **Nathan SD**. The Role of identification and treatment of comorbidities in IPF and other fibrotic lung diseases. Current Opinions in Pulmonary Medicine 2015. Edited by Lucas Richeldi and Kevin Flaherty.
11. King CS, **Nathan SD**. Treatment of Pulmonary Hypertension in Interstitial Lung Disease. For Pulmonary Hypertension and Interstitial lung disease. Edited by Robert P. Baughman, Roberto G. Carbone and **Steven D. Nathan**. Published by Springer 2017
12. Shlobin OA, **Nathan SD**. Rare ILD and PH. For Pulmonary Hypertension and Interstitial lung disease. Edited by Robert P. Baughman, Roberto G. Carbone and Steven D. Nathan. Published by Springer 2017
13. **Nathan SD**. Interstitial Lung Disease and Pulmonary Hypertension. Pulmonary Circulation: Diseases and their treatment, Fourth Edition. Editors, Peacock, Naeije and Rubin. CRC Press. Published September 2016
14. Understanding the Role of Comorbidities in Interstitial Lung Diseases. Shifren A, Russell T, Anderson A, **Nathan SD**. For Clinical Handbook of Interstitial Lung Disease, edited by Drs. Muhunthan Thillai, David R. Moller, and Keith C. Meyer. Published by CRC Press 2018
15. Meyer KC, **Nathan SD**. Mimics of Idiopathic Pulmonary Fibrosis. Idiopathic Pulmonary Fibrosis-2nd edition (edited by Meyer and **Nathan**).
16. King CS, Aryal S, **Nathan SD**. Idiopathic Pulmonary Fibrosis: Phenotypes and Comorbidities for Idiopathic Pulmonary Fibrosis-2nd edition (edited by Meyer and **Nathan**).

17. Aryal S, Ahmad K, **Nathan SD**. Group 3 PH: Clinical Features and Treatment: For Encyclopedia of Respiratory Medicine, 2nd Edition Medicine being published by Elsevier.
<https://doi.org/10.1016/B978-0-12-801238-3.11655-1>
18. **Nathan SD**, Barberà JA. Controversies in the Management of Pulmonary Hypertension in the Setting of Lung Disease. For book Pulmonary Hypertension: Controversial and Emerging Topics. Submitted July 5th, 2019. To be published by Springer.
19. Baris A, Basyigit I, **Nathan SD**. Idiopathic Interstitial Pneumonias. For the book, United Airways: from the nostrils to the alveoli. Argun Barış, S., Başyigit, I., Nathan, S.D. (2023). Idiopathic Interstitial Pneumonias. In: Cingi, C., Yorgancioğlu, A., Bayar Muluk, N., Cruz, A.A. (eds) Airway diseases. Springer, Cham. https://doi.org/10.1007/978-3-031-22483-6_88-1
20. Shourjo Chakravorty, Shambhu Aryal, Adam Cochrane, **Steven D. Nathan**. Antibody Mediated Rejection -Mechanisms, Pathology and Therapeutics. submitted to Current Pulmonology Reports on 22 December 2023.
21. Christopher Thomas, Vikramjit Khangoora, **Steven D. Nathan**. Pulmonary Hypertension associated Interstitial Lung Disease. For 2nd Edition of Clinical Handbook of Interstitial Lung Disease, Editors: Muhunthan Thillai, Keith Meyer and Steven Nathan. CRC Press

Books & Editors:

1. Idiopathic Pulmonary Fibrosis. Edited by Keith Meyer, MD and **Steven Nathan, MD**. Published by Springer 10/9/2013
2. Current Opinions in Pulmonary Medicine. Interstitial Lung Diseases 2014. **Nathan SD**, Bonella F Co-editors.
3. Current Opinions in Pulmonary Medicine. Interstitial Lung Diseases 2015. **Nathan SD**, Bonella F Co-editors.
4. Current Opinions in Pulmonary Medicine. Interstitial Lung Diseases 2016. **Nathan SD**, Bonella F Co-editors.
5. Handbook of IPF. **Nathan SD**, King C, Brown AW. Springer-published 2016.
6. Pulmonary Hypertension and Interstitial lung disease. Edited by Robert P. Baughman, Roberto G. Carbone and **Steven D. Nathan**. Commissioned by Springer December 2013. Published August 25 2017
7. Idiopathic Pulmonary Fibrosis.(2nd edition) Edited by Keith Meyer, MD and **Steven Nathan, MD**. Published by Springer January 3rd, 2019. <https://www.springer.com/us/book/9783319999746> <https://rd.springer.com/book/10.1007%2F978-3-319-99975-3>
8. Current Opinions in Pulmonary Medicine. Interstitial Lung Diseases 2020 .**Nathan SD**, King C. C o-editors.

Research Grants:

Pharmaceutical Multicenter studies

1. Double-Blind Randomized Controlled Study of Pirfenidone in IPF. Marnac 1997. Phase 2 study (Principal Investigator (PI))
2. A Randomized, Double-Blind, Placebo-Controlled Study of Subcutaneous interferon-gamma1b in Patients with IPF (G-IPF001). \$60,000 from Intermune Pharmaceuticals. Phase 3 study (PI)
3. A Randomized, Double-Blind, Placebo-Controlled Phase 2 Study of Etanercept for IPF. Research Grant from Wyeth Pharmaceuticals 2002-2004. Phase 2 study (PI)
4. A Multicenter, Randomized, Parallel Placebo-Controlled Study Of The Safety And Efficacy Of Subcutaneous Remodulin Therapy After Transition From Flolan In Patients With Pulmonary Arterial Hypertension. United Therapeutics 2002. Phase 4 study (PI)
5. A Randomized, Double-Blind, Placebo-Controlled Phase 2 Study of Imitinab Mesylate for IPF. Research Grant from Novartis 2003-2004. Phase 2 study (PI)
6. Inspire study: A Randomized, Double-Blind, Placebo-Controlled Study of Subcutaneous interferon-gamma1b in Patients with IPF (G-IPF007). Intermune Pharmaceuticals. Phase 3 study (PI)
7. Aerosolized iloprost: a Clinical Trial in IPF to Improve Ventilation and Exercise (Active Trial). Cotherix, Inc. 2005. Phase 2 study (Associate PI)
8. Endobronchial Valve for Emphysema PalliatioN Trial (VENT Study). Emphasys Medical, Inc. 2005. Phase 3 study (PI)
9. Compass Study of sildenafil versus sildenafil and bosentan for pulmonary arterial hypertension . Actelion 2006. Phase 3 study (PI)
10. Freedom study of oral treprostinil for pulmonary arterial hypertension. United Therapeutics 2006. Phase 3 study (PI)
11. Reveal Registry for Pulmonary Arterial Hypertension. Actelion 2006 (PI)
12. Pirfenidone for IPF (Capacity 2 study). Intermune 2006. Phase 3 study (PI)
13. A Retrospective Chart Review to Assess the Safety and Efficacy of Transitioning Patients on Ventavis to Remodulin. United Therapeutics 2007
14. BUILD-3 study of Bosentan in IPF. Actelion 2007. Phase 3 study (PI)
15. Inhaled cyclosporine for the prevention of bronchiolitis obliterans syndrome in lung transplant recipients. APT Pharmaceuticals 2008. Phase 3 study (PI)

16. Inhaled Treprostinil for Pulmonary Hypertension in IPF. United Therapeutics. Phase 1 study. October 2008 (PI)
17. Artemis-IPF study. Ambrisentan for IP Gilead August 2009. Phase 3 study (PI)
18. Artemis-PH study. Ambrisentan for IPF complicated by pulmonary hypertension. Gilead August 2009. Phase 3 study (PI and Chair of Steering Committee)
19. Ventavis to Inhaled Remodulin switch study. United Therapeutics 2009. Phase 4 study (PI)
20. A Phase 2a, Open-Label, Single-Arm Study to Evaluate the Safety, Tolerability, and Efficacy of FG-3019 in Subjects with Idiopathic Pulmonary Fibrosis. Protocol FGCL-3019-049. Fibrinogen 2011. (PI)
21. A 52 weeks, double blind, randomized, placebo-controlled trial evaluating the effect of oral BIBF 1120, 150 mg twice daily, on annual Forced Vital Capacity decline, in patients with Idiopathic Pulmonary Fibrosis (IPF). Protocol number 1199.32. Boehringer Ingelheim Pharmaceuticals, Inc. 2011 (PI)
22. A prospective, longitudinal, non-pharmacological, case-controlled study to evaluate longitudinal disease behavior and biomarker data over a 52-week period in IPF patients. Sanofi Aventis (PI)
23. Phase 2 Clinical Trial utilizing nebulized inhaled Nitrite for patients with PAH. Aires Pharmaceuticals. 2012-2014 (PI)
24. A Phase 2, Randomized Dose-ranging Study to Evaluate the Efficacy of Tralokinumab in Adults with Idiopathic Pulmonary Fibrosis. MedImmune 2012-15
25. RAINIER study of simtuzumab for IPF. Gilead 2013-2016. PI
26. A Randomized, Double-Blind, Placebo-Controlled Study To Evaluate the Efficacy and Safety of BG00011 in Patients With Idiopathic Pulmonary Fibrosis. Phase 2 b study. Biogen 2018- (PI)
27. Bronchial Sample Collection for a Novel Genomic Test-BRAVE study. (Role: PI) 07/2013–present
28. Pulmonary Fibrosis Foundation Patient Registry (Role: SI) 07/2013 – present
29. Pulmonary Arterial Hypertension Registry (Role: SI) 07/2015 – present
30. Boehringer Ingelheim Pharmaceuticals, Inc. - 1199.247, A double blind, randomized, placebo-controlled trial evaluating the efficacy and safety of nintedanib over 52 weeks in patients with Progressive Fibrosing Interstitial Lung Disease (PF-ILD) (Role: SI) 07/2017- present
31. Protocol LTI-301:A Phase 3 Open-label, Multicenter Study to Evaluate the Long-term Safety and Tolerability of Inhaled LIQ861 (Treprostinil) in Pulmonary Arterial Hypertension (WHO Group 1) Patients (Role: SI) 06/2018- 10/2020
32. A Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Efficacy and Safety of

BG00011 in Patients With Idiopathic Pulmonary Fibrosis (Role: PI) 07/2018 - 08/2020

33. Extracorporeal Photopheresis for the Management of Progressive Bronchiolitis Obliterans Syndrome in Medicare-Eligible Recipients of Lung Allografts (Role: SI) 11/2018- present
34. BT-L-CsA-301-SLT (BOSTON-1): A Phase III, Prospective, Multicenter, Randomized, Controlled Clinical Trial to Demonstrate the Efficacy and Safety of Liposomal Cyclosporine A (L-CsA) Inhalation Solution Delivered via the PARI Investigational eFlow® Device plus Standard of Care versus Standard of Care Alone in the Treatment of Chronic Lung Allograft Dysfunction/Bronchiolitis Obliterans Syndrome in Patients post Single Lung Transplantation (Role: SI) 12/2018- present
35. Retrospective Evaluation of *IPF* Patients: Real-World Experience from the Trio Health Network (Role: PI) 03/2019- present
36. Retrospective Evaluation of *PAH* Patients: Real-World Experience from the Trio Health Network (Role: PI) 03/2019- present
37. EVP-DEV-LTX-301 Increasing Lung Transplant Availability Using Normothermic Ex Vivo Lung Perfusion (EVLP) at a Dedicated EVLP Facility (Role: SI) 06/2019- present
38. A Phase 3 Randomized Study to Evaluate the Safety and Antiviral Activity of Remdesivir (GS-5734™) in Participants with *Severe* COVID-19 (Role: SI) 03/2020- 08/2020
39. A Phase 3 Randomized Study to Evaluate the Safety and Antiviral Activity of Remdesivir (GS-5734™) in Participants with *Moderate* COVID-19 (Role: SI) 03/2020- 08/2020
40. Expanded Access Treatment Protocol: Remdesivir (RDV;GS-5734) for the Treatment of SARS-CoV2 (CoV) Infection (Role: SI) 03/2020- 08/2020
41. An adaptive phase 2/3, randomized, double-blind, placebo-controlled study assessing efficacy and safety of sarilumab for hospitalized patients with COVID-19 (Role: SI) 03/2020- 12/2020
42. A Randomized Double-blind Placebo-controlled Study to Evaluate the Safety and Efficacy of ATYR1923 In Adult Patients with Severe Pneumonia Related To SARS-CoV-2 Infection (COVID-19) (Role: SI) 04/2020-12/2020
43. Open-label Treatment of severe Coronavirus Disease 2019 (COVID-19) with convalescent plasma collected from individuals with documented infection and recovery from COVID-19 (SARS-CoV) (Role: SI) 04/2020-12/2020
44. A Multi-Center, Adaptive, Randomized, Double-Blind, Placebo-Controlled Study to Assess the Efficacy and Safety of Gimsilumab in Subjects With Lung Injury or Acute Respiratory Distress Syndrome (ARDS) Secondary to Coronavirus Disease 2019 (COVID-19) (Role: SI)

05/2020-12/2020

45. A Phase II Study Evaluating Fostamatinib for Hospitalized Adults with COVID-19
(Role: PI) 08/2020- present
46. Protocol VX19-864-101: A Phase 2, Randomized, Double-blind, Placebo-controlled Study of the Efficacy and Safety of VX-864 in PiZZ Subjects. (Role: SI) 12/2020- present
47. Assessing Safety, Hospitalization and Efficacy of rNAPc2 in COVID-19 (ASPEN-COVID-19)
(Role: PI) 03/2021 - present

Investigator initiated studies

1. Research grant from the ALA of Northern Virginia for the study of Advanced Lung Diseases. \$10,000 1997 (PI)
2. Endobronchial stents for patients with advanced COPD. \$12,000 from Boston Scientific 1997 (PI)
3. Research grant from Intermune Pharmaceuticals for research into IPF. \$10,000 (PI)
4. Development of a Questionnaire for the detection of IPF. Research Grant for \$60,000 from Intermune Pharmaceuticals 2003. (PI)
5. Anemia in Chronic Lung Disease. \$32,600 from Ortho Biotech 2004 (PI)
6. Voriconazole Prophylaxis in Lung Transplant Recipients. \$12,000 from Pfizer (PI)
7. Inhaled iloprost for parenchymal lung disease. \$75,000 from Cotherix 2006 (PI)
8. Idiopathic Pulmonary Fibrosis and Pulmonary Hypertension. \$25,000 from Intermune 2006 (PI)
9. Tailored Therapy for IPF. Inova Health Systems grant \$15,000. July 2007 (PI)
10. The Six Minute Walk Test: Reproducibility and Comparison to a Stair-Step Test. Inova Health Systems grant \$15,000. July 2008 (PI)
11. Antimicrobial Peptides in Idiopathic Pulmonary Fibrosis. George Mason University-Inova research grant \$40,000. September 2009 (associate PI)
12. Safety and feasibility of switching from oral to parenteral treprostinil. \$101,000 Funded by United Therapeutics November 2012
13. Pulmonary Rehabilitation in COPD: response to inhaled Treprostinil. Funded by United Therapeutics \$284,754.00 February 2014 (co-PI)

Federal Funding

1. NIH intramural grant for a NIH-Inova Advanced Lung Disease Program - \$1,538,000.00 over 5 years. September 28th, 2007
2. Response and Adaptation to Aerobic Exercise in Patients with Pulmonary Hypertension: NIH intramural grant for Pulmonary Rehabilitation protocol 2008. \$228,000
3. Validation of a multi-gene test for lung cancer risk. Prime Award No 1RC2CA148572. Subaward No. NS 2011-81 2011
4. National Biological Sample and Data Repository for Pulmonary Arterial Hypertension- R24 grant. January 2012
5. NIH intramural grant for a NIH-Inova Advanced Lung Disease Program extension - \$278,615.00 per year 2013-2017. PI
6. NIH grant Genome Transplant Dynamics. Protocol number 15-1906. August 2015 \$248,062.50 for one year. PI
7. Exercise Therapy for Advanced Lung Disease Trials: Response & Adaptation to Aerobic Exercise in Patients with Advanced Lung Disease. 9/8/2014-9/7/2017 IDIQ Contract Number HHSN269201400004I \$455,780.00. PI

Supplemental information available on request

- 1. Grand Rounds and talks at National/International meetings: N=280 (as of 10/09/2023)**
- 2. Abstracts; N=468 (as of 10/09/2023)**
- 3. Electronic Publications and presentations: N=54**



January 2025

Frederic W. Selck, Ph.D.

Managing Director

Fred Selck, Ph.D. is a Managing Director at Secretariat Advisors, LLC. His primary focus is the intersection of healthcare and economics. He applies his expertise in healthcare, health insurance, pharmaceuticals, medical devices, and healthcare policy to help clients solve complex issues.

He has particular expertise in the following areas:

- Health economics
- Applied economics
- Innovation and intellectual property
- Markets and competition
- Class certification

Dr. Selck has over a decade of experience as a consulting expert and testifying expert. He has testified in U.S. District Court, U.S. Bankruptcy Court, and the Delaware Court of Chancery.

Examples of Dr. Selck's testifying work include:

- *United Therapeutics Corporation v. Liquidia Technologies, Inc.* United States District Court, Delaware, Case No. 23-975. Submitted a declaration and was deposed in support of a preliminary injunction of Liquidia's Yutrepla.
- *Julien v. Lacefield et al.*, Case No. 1:17-CV-04045-MLB, United States District Court, Northern District of Georgia. Submitted a report, rebuttal report, and deposition on behalf of the Georgia Board of Dentistry in a matter alleging that the Board's licensing rules were anticompetitive.
- *Sanofi-Aventis Deutschland GmbH v. Amgen, Inc.*, Munich Regional Court (Germany) Submitted an expert report rebutting economic damages associated with Germany's Praluent injunction.
- *Himawan, et al. v. Cephalon, Inc., et al.*, C.A. No. 2018-0075-SG, Delaware Court of Chancery. Submitted a report, deposition, and trial testimony on behalf of Teva (which acquired Cephalon) in a matter involving whether commercially reasonable efforts were performed in developing a pipeline product.
- *AmerisourceBergen Drug Corporation et al. v. Ace American Insurance Company et al.*, No. 17-C-36, Circuit Court of Boone County, West Virginia. Submitted a report and provided deposition testimony on behalf of Ace in a matter involving whether AmerisourceBergen's diversion prevention efforts had an effect on the oversupply of opioids in West Virginia.

Prior to Intensity, Dr. Selck was a Partner at Bates White where his life sciences and healthcare expertise were applied to wide variety of matters that include patent infringement, antitrust,

False Claims Act, and fraudulent conveyance claims. Previously, he was a fellow at the National Center for Health Statistics and part of the Health Economics Research Group at the Centers for Disease Control and Prevention.

In addition to his role at Intensity, Dr. Selck is an adjunct faculty member at Georgetown and Johns Hopkins University, where he teaches graduate-level courses in health economics, innovation, and health care finance. Further, his work has been published in peer-reviewed journals such as *Health Services Research*, *Journal of Public Health Management and Practice*, *Statistics in Medicine*, and *Annals of Surgery*, among others.

Education

Ph.D., Applied Economics, Johns Hopkins University

M.A., Economics, City University of New York, Hunter College

B.A., Economics, City University of New York, Hunter College

Professional Experience

Intensity, LLC. Managing Director, 2023 to present.

Bates White Economic Consulting. Partner, 2022 to 2023.

Bates White Economic Consulting. Principal, 2020 to 2022.

Bates White Economic Consulting. Manager, 2017 to 2019.

Bates White Economic Consulting. Senior Economist, 2015 to 2016.

Bates White Economic Consulting. Economist, 2014 to 2015.

Johns Hopkins University. Professional Faculty in Health Economics and Health Finance, 2013 to present.

National Center for Health Statistics Centers for Disease Control and Prevention. Senior Service Fellow, 2013 to 2014.

National Center for Health Statistics Centers for Disease Control and Prevention. Associate Service Fellow, 2012 to 2013.

National Center for Health Statistics. Expert, 2010 to 2011.

Center for Biosecurity. Contributing Scholar, 2008 to 2014.

City University of New York, Hunter College. Undergraduate Advisor, Economics, 2007 to 2008.

New York Organ Donor Network. Research Analyst, 2006 to 2008.

New York Organ Donor Network. Organ Placement Coordinator, 2004 to 2006.

Citigroup. Project Manager, Global Stock Options Group, 2002 to 2004.

Citigroup. Project Manager, Pilot Revenue Program, 2001 to 2002.

Selected Experience

Matters involving intellectual property (IP) and other commercial disputes

Serving as a testifying expert on behalf of a national pharmaceutical distributor involving the assessment of *bona fide* services used as part of a Foreign Direct Investment Income deduction.

Served as a testifying expert on behalf of a worker's compensation insurer in a matter involving pricing data and the reimbursement of prescription drug claims. Report submitted in April 2021. Adjudication hearing testimony before a worker's compensation judge was in March 2022.

Served as a testifying expert on behalf of the Debtors in the *Mallinckrodt plc bankruptcy* in the U.S. Bankruptcy Court for the District of Delaware. Opined on the reasonableness of the settlement between the U.S. Department of Justice to resolve False Claims Act allegations related to Mallinckrodt's Acthar Gel. Deposition was in September 2021. Confirmation hearing testimony was in December 2021.

Served as the testifying expert in a matter involving the expected lifetime costs associated with the use of biologics and how these costs are affected by the loss of IP exclusivity. Rebuttal report submitted in April 2021. Deposition was in April 2021. Matter was settled before trial.

Served as the arbitration expert on behalf of a global pharmaceutical manufacturer in estimating damages resulting from a licensee's delay in bringing a biologic to market. Matter was settled.

Led the consulting team advising the Special Committee to the Debtors in the *Purdue Pharma bankruptcy* in the U.S. Bankruptcy Court for the Southern District of New York.

Leading the team advising a global pharmaceutical manufacturer on the value of their pharmaceutical IP portfolio. Advised the same manufacturer in a multibillion-dollar acquisition of another pharmaceutical innovator, focusing on the value of the target's IP portfolio and its potential royalty obligations to other parties.

Served as the consulting expert and led the consulting team on behalf of the Defendants in a class action alleging the participation of pharmacy benefit managers in the price inflation of a popular brand-name pharmaceutical product. Class certification was denied.

In *Amgen Inc. v. Sanofi Aventisub LLC and Regeneron Pharmaceuticals, Inc.*, led the team supporting the testimony of Dr. Ernst R. Berndt regarding the eBay factors in a matter involving permanent injunction on behalf of Amgen, alleging infringement of its patents. Analyzed data and other materials relevant to the assessment of the four *eBay* factors: irreparable harm, inadequacy of monetary damages, balance of burdens, and public interest.

On behalf of the plaintiff in *Wells Fargo Bank et al. v. Merrimack Pharmaceuticals, Inc.*, co-led the team supporting the expert and performed a valuation of Merrimack's pipeline of oncology drugs that supported the opinion that the sale of Merrimack's sole commercial product constituted a fundamental change of the company.

Matters involving allegations of anticompetitive conduct

Served as the consulting expert in a matter involving pharmaceutical "pay for delay" allegations on behalf of a large third-party payer. Analyzed physician prescribing and formulary data to define the relevant market. Analyzed pricing and rebate data to estimate damages associated with the alleged anticompetitive conduct.

Served as a testifying expert in *Choker et al. v. Pet Emergency Clinic, P.S.* on behalf of two veterinarians in a matter involving alleged non-compete agreements in a regional emergency

veterinary care market. Opined on market definition and the price effects of market concentration. Declaration submitted March 2021. Report submitted January 2022.

In *State of Wisconsin et al. v. Indivior Inc. f/k/a Reckitt Benckiser Pharmaceuticals Inc. et al.*, led the team analyzing alleged anticompetitive conduct on behalf of more than 40 state attorneys general. Plaintiffs allege that Indivior, formerly a part of Reckitt Benckiser, engaged in anticompetitive “product hop” behavior in order to move prescribing from its Suboxone Tablets product to its Suboxone Film line extension to maintain profits in anticipation of generic tablet competition. Analyzed data and other material to estimate degree of foreclosed competition and disgorgement.

Matters involving allegations of false claims

In *Edward Lacey v. Visiting Nurse Service of New York (VNSNY)*, served as the testifying expert on behalf of the nation’s largest not-for-profit home- and community-based healthcare provider. Testimony responded to allegations that employees systematically ignored prescribed Plans of Care and falsified visits billed, relying on a review of medical records to defend claims of systematic fraud. Rebuttal report refuted the work of four opposing experts, showing that their work failed to account for contradictory testimony and was at odds with clear signals in the data, rendering their conclusions unreliable.

In *United States v. Novartis Pharmaceuticals Corp. and BioScrip, Inc.*, provided consulting expertise for Novartis on the economics of pharmacy dispensing, government reimbursements, and adherence in connection with alleged FCA violations associated with alleged kickbacks concerning Novartis’s distribution of two specialty brand-name pharmaceuticals: Myfortic and Exjade.

Publications (Peer-Reviewed)

Selck, Frederic and S.L. Decker: “Health Information Technology Adoption in the Emergency Department,” (2016) *Health Services Research*. 51 (no. 1), 32-47.

Selck, Frederic, AM. Brown, and S.L. Decker: “Emergency Department Visits and Proximity to Patients’ Residences,” (2015) *NCHS Data Brief*. 192, 1-8.

Selck, Frederic, M. Schoch-Spana, and L. Goldberg: “A National Survey on Health Department Capacity for Community Engagement in Emergency Preparedness,” (2015) *Journal of Public Health Management and Practice*. 21 (no. 2), 196-207.

Selck, Frederic, A. Adalja, and C. Franco: “An Estimate for the Global Costs of Dengue Fever,” (2015) *Vector-borne and Zoonotic Diseases*. 14 (no. 11), 824-26.

Selck, Frederic, M. Watson, K. Rambhia, R. Morhard, C. Franco, and E.S. Toner: “Medical Reserve Corps Volunteers in Disasters: A Survey of their Roles, Experiences, and Challenges,” (2014) *Biosecurity and Bioterrorism*. 12 (no. 2), 85-93.

Selck, Frederic, Y. He, and S.T. Normand: “On the accuracy of classifying hospitals on their performance measures,” (2013) *Statistics in Medicine*. 33 (no. 7), 1081-1103.

Selck, Frederic, J.F. Bridges, S.C. Searle, and N.A. Martinson: “Designing Family-Centered Male Circumcision Services: A Conjoint Analysis Approach,” (2012) *The Patient*. 5 (no. 2), 101-11.

Selck, Frederic and S.L. Decker: “Was the Increase in U.S. Welfare Participation in the 1960s Really Unexplained?” (2012) *Review of Economics of the Household*. 10 (no. 4), 541-56.

Selck, Frederic, K.J. Rhambia, R.E. Waldhorn, A.K. Mehta, C. Franco, and E.S. Toner: "A Survey of Hospitals to Determine the Prevalence and Characteristics of Health Coalitions for Emergency Preparedness and Response," (2012) *Biosecurity and Bioterrorism*. 10 (no. 3), 304-13.

Selck, Frederic, E. Sheehy, K. O'Connor, R. Luskin, R. Howard, D. Cornell, J. Finn, T. Mone, and F. Delmonico: "Investigating Geographic Variation in Mortality in the Context of Organ Donation," (2012) *American Journal of Transplantation*. 12 (no. 6), 1598-1602.

Selck, Frederic, J.F.P. Bridges, G. Gray, J. McIntyre, and N.A. Martinson: "Condom Avoidance and the Determinants of Demand for Male Circumcision—A Conjoint Analysis," (2011) *Health Policy and Planning*. 26 (no. 4), 298-306.

Selck, Frederic, S.P. Wall, B.J. Kaufamn, A.J. Gilbert, Y. Yshkov, M. Goldstein, J.E. Rivera, D. O'Hara, H. Lerner, M. Saveta, M. Torres, C.L. Smith, Z. Hedrington, K.G. Munjal, M. Machado, S. Montella, M. Pressman, L.W. Teperman, N.N. Dubler, and L. R. Goldfrank: "Derivation of the Uncontrolled Donation after Circulatory Determination of Death for New York City," (2011) *American Journal of Transplantation*. 11 (no. 7), 1417-26.

Selck, Frederic, J.F.P. Bridges, S.C. Searle, and N.A. Martinson: "Engaging Families in the Design of Social Marketing Strategies for Male Circumcision Services in Johannesburg, South Africa," (2010) *Social Marketing Quarterly*. 16 (no. 3), 60-76.

Selck, Frederic, E.B. Grossman, L.E. Ratner, and J.F. Renz: "Utilization, Outcomes, and Retransplantation of Liver Allografts from Donation after Cardiac Death: Implications for Further Expansion of the Deceased-Donor Pool," (2008) *Annals of Surgery*. 248 (no. 4), 599-607.

Selck, Frederic, P. Deb, and E.B. Grossman: "Deceased Organ Donor Characteristics and Clinical Interventions Associated with Organ Yield," (2008) *American Journal of Transplantation*. 8 (no. 5), 965-74.

Selck, Frederic and Y. Yushkov: "An Approach to Needle Biopsy Technique to Increase Glomerulus Yield," (2008) *Transplantation Proceedings*. 40 (no. 4), 1051-53.

Working Papers

"Penalizing Generic Drugs with the CPI Rebate Will Reduce Competition and Increase the Likelihood of Drug Shortages." With Richard Manning. 2017. Available at www.accessiblemeds.org/sites/default/files/2017-09/Bates-White-White-Paper-Report-CPI-Penalty-09-12-2017.pdf.

"Can Care Provided at Community Health Centers Substitute for Emergency Room Care for the Uninsured?" With S.L. Decker. 2015. Revision requested from *Health Services Research*.

"Community Health Centers and Access to Care for the Uninsured." With S.L. Decker. 2015. Revision requested from *Health Economics*.

"Physician Agency and the Cost of Diligence: Evidence from Prescribing Behavior in Medicaid." With S.L. Decker and B. Herring. 2015.

"Transplant Market Concentration and the Underutilization of Viable Organ Donors: Theory and Evidence from Liver Transplants." With B. Herring. 2015.

“Who among the Working-Age Disabled on Medicaid Transitions into Dual Eligibility?” With S.L. Decker. 2015.

Presentations and Panels

“The Pitfalls of Using Sampling for False Claims Act Liability.” Southern Economics Association Annual Meeting, Washington, D.C., 2016.

“Case Study: Irreparable Harm and Public Interest.” Bates White Life Sciences Symposium, Washington, D.C., 2016.

“The Role of an Economist in Life Sciences Litigation.” Eastern Economics Association Annual Meeting, Washington, D.C., 2016.

“Our Best Shot: Expanding Prevention through Vaccination in Older Adults.” Alliance for Aging Research Briefing, Washington, D.C., 2015.

“Transplant Market Competition and the Utilization of Suboptimal Organ Donors: Theory and Evidence from Liver Transplants.”

- American Society of Health Economists Bi-annual Meeting, 2014.
- Southeastern Health Economics Study Group, 2012.
- AcademyHealth Health Economics Interest Group, 2012.
- AcademyHealth Annual Research Meeting (Selected as Best Abstract), 2012.
- Johns Hopkins Health Economics Seminar, 2011.

“Who among the Working-age Disabled on Medicaid Transitions into Dual Eligibility?”

- American Society of Health Economists Bi-annual Meeting, 2014.
- George Mason University Health Administration and Policy Seminar, 2014.

“Health Information Technology Adoption in the Emergency Department.”

- AcademyHealth Annual Research Meeting, 2013.
- Workshop on Health Information Technology and Economics, 2012.

“NCHS Linked Data Files: Resources for Research and Policy.” Agency for Healthcare Research and Quality, Rockville, Maryland, 2013.

“Differences in the Use of Ambulatory Health Care by Insurance Status and the Role of Community Health Centers.”

- Federal Committee on Statistical Methodology, 2012.
- Eastern Economics Association, 2011.
- Association for Public Policy Analysis and Management Fall Research Meeting, 2011.
- Johns Hopkins Health Economics Seminar, 2011.

“Do Physicians Account for Out-of-Pocket Costs when Prescribing? Theory and Evidence from Medicaid.”

- Association for Public Policy Analysis and Management Fall Research Meeting, 2012.
- AcademyHealth Annual Research Meeting, 2012.

- American Society of Health Economists Bi-annual Meeting, 2012.

“Using Drug Data from the National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey.” National Conference on Health Statistics, Washington, D.C., 2012.

“Evaluating Cost and Effectiveness for Prepositioning Strategies for Medical Countermeasures.” Institute of Medicine Board on Health Sciences Policy, Washington, D.C., 2011.

“Measuring the Global Costs of Infectious Disease.” Center for Biosecurity—UPMC, Washington, D.C., 2009.

“Deceased Organ Donor Characteristics and Clinical Interventions Associated with Organ Yield.”

- American Society of Transplantation Annual Research Meeting, 2008.
- North American Transplant Coordinators Organization Annual Meeting, 2007.

“Utilization, Outcomes, and Retransplantation of Liver Allografts from Donation after Cardiac Death: Implications for Further Expansion of the Deceased-Donor Pool.” International Liver Transplantation Society Meeting, 2008.

Honors and Distinctions

Inaugural Johns Hopkins Alison Snow Jones Memorial Prize, 2012.

AcademyHealth/NCHS Health Policy Fellowship, 2011 to 2012.

Johns Hopkins Sommer Scholar Graduate Fellowship, 2008 to 2013.

Co-Investigator, Health Resource and Services Administration, 2007 to 2008.

Professional Activities

Project Lead, Housing and Urban Development/NCHS Data Linkage, Centers for Disease Control and Prevention, 2013 to 2014.

Steering Committee Member, Health Economics Research Group, Center for Disease Control and Prevention, 2013 to 2014.

Chair, Honors and Awards Subcommittee, Student Coordinating Committee, Johns Hopkins University, 2009 to 2010.

President, AcademyHealth Chapter of Johns Hopkins University, 2008 to 2009.

President, Hunter College Society for Economics, 2007 to 2008.

Referee

Biosecurity and Bioterrorism

BMC Family Practice

BMC Medical Research Methodology

European Journal of Public Health

Health Affairs

Health Care: The Journal of Delivery Science and Innovation

Journal of Healthcare Engineering

Journal of the International Association for Official Statistics

Statistics in Medicine

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Education:
Ph.D. (Statistics) Stanford University, 1977.
M.S. (Statistics) Stanford University, 1973.

B.A. (Mathematics, Philosophy) Pomona College, 1972. Magna cum laude

Professional:
All at the University of Chicago:

2018– Professor Emeritus, Departments of Statistics and Public Health Sciences and the College
2014–2018 Vice-Provost, Academic Affairs
2009–2018 Member, Committee on Clinical and Translational Science
2007–2014 Director, Population Sciences, Institute for Translational Medicine
2005–2018 Member, Center for Cognitive and Social Neuroscience
2001–2008 Member, Institute for Mind and Biology
2000–2014 Director, Biostatistics Core Facility, University of Chicago Cancer Research Center
1999–2012 Chairman, Department of Health Studies (now Public Health Sciences)
1999–2012 Co-Director, Clinical Research Training Program
1996–2018 Professor, Department of Public Health Sciences (Health Studies until 2014)
1993–1998 Co-Director, Robert Wood Johnson Clinical Scholars Program
1993–2018 Professor, Committee on Clinical Pharmacology and Pharmacogenomics
1992–2018 Professor, Departments of Statistics, Anesthesia & Critical Care, and the College
1989–1992 Associate Professor, Department of Anesthesia and Critical Care
1982–1992 Associate Professor, Department of Statistics and the College
1979–1982 Leonard Jimmie Savage Assistant Professor, Department of Statistics and the College
1976–1982 Assistant Professor, Department of Statistics and the College

Honors:
Phi Beta Kappa, Pomona College, 1972.
Sigma Xi, The University of Chicago, 1977.
The Llewellyn John and Harriet Manchester Quantrell Award for Excellence in
Undergraduate Teaching, 1981.
Gold Key Award, University of Chicago Biological Sciences, 2018.

Professional Societies:

American Association for the Advancement of Science (Elected Fellow, 1992)
1994–1997 Electorate Nominating Committee, Section on Statistics
American Statistical Association (Elected Fellow, 1988)
1987–1989 Section on Statistical Graphics, Chair (1988)
Association for Computing Machinery
International Biometric Society, ENAR
Institute of Mathematical Statistics
1989–1993, 1999–2002 Management Committee, *Current Index to Statistics*
Royal Statistical Society (Fellow)
Society for Industrial and Applied Mathematics, (Visiting Lecturer, 1979–80) –2024

Editorial:
Computing Reviews, Reviewer (1978–1987).
J American Statistical Assoc, Associate Editor (1979–1985, 1987–1988).
SIAM J Scientific and Statistical Computing, Editorial Board (1983–1985).
ACM Trans on Math Software, Associate Editor (1990–1992).
Current Index to Statistics, Database Ed. (1994); Managing Ed. (1995); Editor (1996–1998).

Selected Publications

Books

- [1] *Elements of Statistical Computing: Numerical Computation*. Chapman & Hall: London. 1988.
- [2] The Chicago Social Brain Network. *Invisible Forces and Powerful Beliefs: Gravity, Gods, and Minds*. FT Press Science: Upper Saddle River, NJ. 2010.

Original Articles

- [2] "The Prediction of Homicide with the Rorschach" (D Lester, J Kendra, R Thisted, W Perdue). *J. Clinical Psych.*, **31**, (1976), 752.
- [3] "Estimating the Number of Unseen Species: How Many Words Did Shakespeare Know?" (B Efron, RA Thisted). *Biometrika*, **63**, (1976), 435-447.
- [4] *Ridge Regression, Minimax Estimation, and Empirical Bayes Methods*. Ph.D. Thesis, Department of Statistics, Stanford University (1976).
- [5] "Prediction of Homicide and Suicide: A Test in a Healthy Risk-Taking Group" (D Lester, JM Kendra, RA Thisted). *Perceptual and Motor Skills*, **44**, (1977), 222.
- [6] "Teaching Statistical Computing Using Computer Packages" (with Discussion), *The American Statistician*, **33**, (1979), 27–35.
- [7] "User Documentation and Control Language I: Evaluation and Comparison of Statistical Computer Packages." *Computers & Education*, **3**, (1979), 135–141.
- [8] "Predicting a Multitude of Time Series" (RA Thisted, WE Wecker). *Journal of the American Statistical Association*, **75**, (1980), 81–86.
- [9] "Lactic Acidemia in Reye's Syndrome" (JH Tonsgard, PR Huttenlocher, RA Thisted). *Pediatrics*, **69**, (1982), 64–69.
- [10] "Maximum Likelihood Estimation of Isotonic Modal Regression" (T Sager, R Thisted). *Annals of Statistics*, **10**, (1982), 690–707.
- [11] "Safety and Efficacy of Chymopapain (Chymodiactin) in Herniated Nucleus Pulposus With Sciatica: Results of a Randomized, Double-blind Study" (MJ Javid, EJ Nordby, LT Ford, WJ Hejna, WW Whisler, C Burton, DK Millett, LL Wiltse, EH Widell Jr, RJ Boyd, StE Newton, RA Thisted). *Journal of the American Medical Association*, **249:18**, (1983), 2489–2494.
- [12] "A Statistical Study of Mate Choice: Sexual Selection in a Plethodontid Salamander (*Desmognathus Ochrophæus*)," (L Houck, SJ Arnold, RA Thisted). *Evolution*, **39**, (1985), 370–386.
- [13] "Chymodiactin in Patients with Herniated Lumbar Intervertebral Disc(s): An Open-Label, Multicenter Study," (DJ McDermott, K Agre, M Brim, FJ Demma, J Nelson, RR Wilson, RA Thisted). *Spine*, **10**, (1985), 242–249.
- [14] "Decreased Incidence and Mortality of Anaphylaxis to Chymopapain," (J Moss, MF Roizen, EJ Nordby, RA Thisted, JL Apfelbaum, BD Schreider, DJ McDermott). *Anesthesia and Analgesia*, **64**, (1985), 1197–1201.
- [15] "Computing Environments for Data Analysis," (with Discussion), *Statistical Science*, **1**, (1986), 259–275.
- [16] "Did Shakespeare Write a Newly-Discovered Poem?" (R Thisted, B Efron). *Biometrika*, **74**, (1987), 445–455.
- [17] "Cervical Injury in Head Trauma," (GL Neifeld, JG Keene, G Hevesy, J Leikin, A Proust, RA Thisted). *Journal of Emergency Medicine*, **6**, (1988), 203–207.
- [18] "Patient-Applied Podofilox for Treatment of Genital Warts," (KR Beutner, MA Conant, AE Friedman-Kien, M Illeman, NN Artman, RA Thisted, DH King). *Lancet*, (1989, April 15), 831–834.
- [19] "Using a National Health Care Data Base to Determine Surgical Complications in Community Hospitals: Lumbar Discectomy as an Example" (L Ramirez, R Thisted). *Neurosurgery*, **25**, (1989), 218–225.

- [20] "Complications and Demographic Characteristics of Patients Undergoing Lumbar Discectomy in Community Hospitals," (L Ramirez, R Thisted). *Neurosurgery*, **25**, (1989), 226–231.
- [21] "Increased Risk for Gestational Diabetes Mellitus Associated with Insulin Receptor and Insulin-like Growth Factor II Restriction Fragment Length Polymorphisms" (C Ober, KS Xiang, RA Thisted, KA Intovina, CJ Wason, S Dooley). *Genetic Epidemiology*, **6**, (1989), 559–569.
- [22] "Alcohol after Midazolam Sedation: Does it Really Matter?," (JL Lichtor, J Zacny, K Korttila, JL Apfelbaum, BS Lane, G Rupani, RA Thisted, C Dohrn), *Anesthesia & Analgesia*, **72**, (1991), 661–666.
- [23] "Spreading Depression Increases Immunohistochemical Staining of Glial Fibrillary Acidic Protein," (RP Kraig, L Dong, R Thisted, CB Jaeger). *Journal of Neuroscience*, **11(7)**, (1991), 2187–2198.
- [24] "Intravenous Lidocaine does not Cause Shivering-like Tremor or Alter Thermoregulation," (B Glosten, DI Sessler, LG Östman, EAM Faure, L Karl, RA Thisted). *Regional Anesthesia*, **16**, (1991), 218–222.
- [25] "The Automated Interview *vs.* the Personal Interview: Do Patient Responses to Preoperative Health Questions Differ?" (RE Lutner, MF Roizen, CB Stocking, RA Thisted, S Kim, PC Duke, P Pompeii, CK Cassel). *Anesthesiology*, **75**, (1991), 394–400.
- [26] "Predictors of Body Surface Area" (Y Wang, J Moss, R Thisted). *Journal of Clinical Anesthesia*, **4**, (1992), 4–10.
- [27] "Alcohol After Intravenous Midazolam-Fentanyl Sedation: Effects on Psychomotor Functioning," (JL Lichtor, J Zacny, JL Apfelbaum, BS Lane, G Rupani, RA Thisted, C Dohrn, K Korttila). *British Journal of Anesthesia*, **67**, (1991) 579–584.
- [28] "Sleep and Psychiatric Disorders: A Meta-Analysis," (RM Benca, WH Obermeyer, RA Thisted, JC Gillin). *Archives of General Psychiatry*, **49**, (1992), 651–668. With editorial.
- [29] "Thromboelastogram Fails to Predict Postoperative Hemorrhage in Cardiac Patients," (JS Wang, CY Lin, WT Hung, MF O'Connor, RA Thisted, BK Lee, RB Karp, MW Yang). *Annals of Thoracic Surgery*, **53**, (1992), 435–439.
- [31] "Central Temperature Changes are not Perceived During Epidural Anesthesia," (B Glosten, DI Sessler, EAM Faure, L Karl, RA Thisted). *Anesthesiology*, **77**, (1992), 10–16.
- [32] "The Risk of Human Immunodeficiency Virus in Surgeons, Anesthetists, and Medical Students," (JM Buergler, R Kim, RA Thisted, MF Roizen). *Anesthesia & Analgesia*, **75**, (1992), 118–124.
- [33] "Reassessment of Preoperative Laboratory Testing Has Changed the Test-Ordering Patterns of Physicians" (A Macario, MF Roizen, RA Thisted, S Kim, FK Orkin, C Phelps). *Surgery, Gynecology & Obstetrics*, **175**, (1992), 539–547.
- [34] "Echocardiographic Analysis of Dysfunctional and Normal Myocardial Segments Before and Immediately After Coronary Artery Bypass Graft Surgery," (P Voci, F Bilotta, S Aronson, G Scibilia, Q Caretta, C Mercanti, B Marino, R Thisted, MF Roizen, A Reale). *Anesthesia & Analgesia*, **75**, (1992), 213–218.
- [35] "The Influence of Intravenous Albunex Injections on Pulmonary Arterial Pressure, Gas Exchange, and Left Ventricular Peak Intensity," (R Walker, JG Weincek, S Aronson, J Zaroff, D Glock, R Thisted, SB Feinstein). *Journal of the American Society of Echocardiography*, **5**, (1992), 463–470.
- [36] "In Vitro Effects of Aprotinin on Activated Clotting Time Measured with Different Activators," (JS Wang, CY Lin, WT Hung, RA Thisted, RB Karp). *Journal of Thoracic and Cardiovascular Surgery*, **104**, (1992), 1135–1140.
- [37] "Can Patients Use an Automated Questionnaire to Define Their Current Health Status?" (MF Roizen, D Coalson, RS Hayward, J Schmittner, RA Thisted, JL Apfelbaum, CB Stocking, P Pompei, DE Ford, *et al*). *Medical Care*, **30**, (1992), MS74–84.
- [38] "Disease-Specific Survival Following Routine Prostate Cancer Screening by Digital Rectal Examination," (GS Gerber, IM Thompson, R Thisted, GW Chodak). *Journal of the American Medical Association*, **269**, (1993), 61–64.

- [39] "The Interaction between Alcohol and the Residual Effects of Thiopental," (JL Lichtor, JP Zacny, DW Coalson, DC Flemming, A Uitvlugt, JL Apfelbaum, BS Lane, RA Thisted). *Anesthesiology*, **79**, (1993), 28–35.
- [40] "A proposal to use confidence intervals for visual analog scale data for pain measurement to determine clinical significance," (S Mantha, R Thisted, J Foss, JE Ellis, MF Roizen). *Anesthesia & Analgesia*, **77**, (1993), 1041–1047.
- [41] "The initial clinical experience of 1819 physicians in maintaining anesthesia with propofol: Characteristics associated with prolonged time to awakening," (JL Apfelbaum, TH Grasela, CC Hug, CH McLeskey, ML Nahrwold, MF Roizen, TH Stanley, RA Thisted, CA Walawander, PF White). *Anesthesia & Analgesia*, **77**, (1993), S10–14.
- [42] "The role of pharmacoepidemiology research in postmarketing surveillance and anesthesia practice/critical care medicine," (TH Grasela, WD Watkins, CC Hug, CH McLeskey, ML Nahrwold, MF Roizen, TH Stanley, RA Thisted, CA Walawander, PF White, JL Apfelbaum). *Anesthesia & Analgesia*, **77**, (1993), S44–50.
- [43] "Hemodynamic effects of propofol: Data from over 25,000 patients," (CC Hug, CH McLeskey, ML Nahrwold, MF Roizen, TH Stanley, RA Thisted, CA Walawander, PF White, JL Apfelbaum, TH Grasela). *Anesthesia & Analgesia*, **77**, (1993), S21–29.
- [44] "Adverse events in a multicenter Phase IV study of propofol: Evaluation by anesthesiologists and PACU nurses," (CH McLeskey, CA Walawander, ML Nahrwold, MF Roizen, TH Stanley, RA Thisted, PF White, JL Apfelbaum, TH Grasela, CC Hug). *Anesthesia & Analgesia*, **77**, (1993), S3–9.
- [45] "Phase IV study of propofol: Validation of the data set," (ML Nahrwold, MF Roizen, TH Stanley, RA Thisted, CA Walawander, PF White, JL Apfelbaum, TH Grasela, CC Hug, CH McLeskey). *Anesthesia & Analgesia*, **77**, (1993), S34–43.
- [46] "How do anesthesiologists select patients when introducing a new drug into practice?" (MF Roizen, TH Stanley, RA Thisted, CA Walawander, PF White, JL Apfelbaum, TH Grasela, CC Hug, CH McLeskey, ML Nahrwold). *Anesthesia & Analgesia*, **77**, (1993), S30–33.
- [47] "Effects on recovery when isoflurane is used to supplement propofol-nitrous oxide anesthesia," (PF White, TH Stanley, JL Apfelbaum, TH Grasela, CC Hug, CH McLeskey, ML Nahrwold, MF Roizen, RA Thisted, CA Walawander). *Anesthesia & Analgesia*, **77**, (1993), S15–20.
- [48] "Predictive and Diagnostic Tests of Renal Failure: A Review," (M Kellen, S Aronson, MF Roizen, J Barnard, RA Thisted). *Anesthesia & Analgesia*, **78**, (1994), 134–142.
- [49] "Association of Preoperative Risk Factors with Postoperative Acute Renal Failure," (BK Novis, MF Roizen, S Aronson, RA Thisted). *Anesthesia & Analgesia*, **78**, (1994), 143–149.
- [50] "Results of Conservative Management of Clinically Localized Prostate Cancer," (GW Chodak, RA Thisted, GS Gerber, J-E Johansson, J Adolfsson, G Jones, G Chisholm, B Moskovitz, J Warner). *New England Journal of Medicine*, **330**, (1994), 242–248.
- [51] "Relative Effectiveness of Four Preoperative Tests for Predicting Adverse Cardiac Outcomes After Vascular Surgery: A Meta-Analysis," (S Mantha, MF Roizen, J Barnard, RA Thisted, JE Ellis, J Foss). *Anesthesia & Analgesia*, **79**, (1994), 422–433.
- [52] "Premedication with Oral and Transdermal Clonidine Provides Safe and Efficacious Postoperative Sympatholysis," (JE Ellis, G Drijvers, S Pedlow, SP Laff, MJ Sorrentino, JF Foss, M Shah, JR Busse, S Mantha, J McKinsey, J Osinski, RA Thisted, MF Roizen). *Anesthesia & Analgesia*, **79**, (1994), 1133–40.
- [53] "Mucosal allergy in the absence of systemic allergy in nasal polyposis and rhinitis: a meta-analysis," (JS Shatkin, KG Delsupehe, RA Thisted, JP Corey). *Otolaryngology – Head & Neck Surgery*, **111(5)**, (1994), 553–6.
- [54] "Estimation of the association between desipramine and the risk for sudden death in 5 to 14-year-old children," (J Biederman, RA Thisted, L Greenhill, ND Ryan). *Journal of Clinical Psychiatry*, **56**, (1995), 87–93.
- [55] "A comparison of intraarticular morphine to bupivacaine for pain control following local knee arthroscopy in the day surgery setting: A prospective, randomized, double-blinded study," (JW

Jaureguito, JF Wilcox, SJ Cohn, RA Thisted, B Reider). *American Journal of Sports Medicine*, **23**, (1995), 350–3.

- [56] “Prospective, randomized, double-blind trial of BQ-123 and bosentan for prevention of vasospasm following subarachnoid hemorrhage in monkeys.” (A Hino, BK Weir, RL Macdonald, RA Thisted, et al) *Journal of Neurosurgery*, **83**, (1995), 503–9.
- [57] “Resolved: cardiac arrhythmias make desipramine an unacceptable choice in children.” (JS Werry, J Biederman, R Thisted, L Greenhill, et al) *Journal of the American Academy of Child & Adolescent Psychiatry*, **34**, (1995), 1239–45; discussion 1245–8.
- [58] “Short-term outcomes after cryosurgical ablation of the prostate in men with recurrent prostate carcinoma following radiation therapy,” (GT Bales, MJ Williams, M Sinner, RA Thisted, GW Chodak), *Urology*, **46**(5), (1995), 676–80.
- [59] “Results of radical prostatectomy in men with clinically localized prostate cancer,” (GS Gerber, RA Thisted, PT Scardino, HG Frohmuller, FH Schroeder, DF Paulson, AW Middleton, Jr., DB Rukstalis, JA Smith, Jr., PF Schellhammer, M Ohori, GW Chodak), *JAMA*, **276**(8), (1996), 615–9.
- [60] “Eye injuries after nonocular surgery. A study of 60,965 anesthetics from 1988 to 1992,” (S Roth, RA Thisted, JP Erickson, S Black, BD Schreider), *Anesthesiology*, **85**(5), (1996), 1020–7.
- [61] “Glutamine protects intestinal epithelial cells: Role of inducible HSP70,” (PE Wischmeyer, MW Musch, MB Madonna, R Thisted, EB Chang), *Am J Physiol (Gastrointest Liver Physiol)*, **35**, 1997, G879–G884.
- [62] “Postcesarean analgesia with both epidural morphine and intravenous patient-controlled analgesia: Neurobehavioral outcomes among nursing neonates.” (B Wittels, B Glosten, EAM Faure, AH Moawad, M Ismail, J Hibbard, JA Senal, SM Cox, SC Blackman, L Karl, RA Thisted) *Anesthesia & Analgesia*, **85** (1997) 600–606.
- [63] “Results of radical prostatectomy in men with locally advanced prostate cancer: multi-institutional pooled analysis.” (Gerber GS, Thisted RA, Chodak GW, Schroder FH, Frohmuller HG, Scardino PT, Paulson DF, Middleton AW Jr, Rukstalis DB, Smith JA Jr, Ohori M, Theiss M, Schellhammer PF) *European Urology*. **32**(4), (1997) 385–390.
- [64] “SPECT brain imaging in epilepsy: a meta-analysis.” (Devous MD Sr, Thisted RA, Morgan GF, Leroy RF, Rowe CC) *Journal of Nuclear Medicine*, **39**(2), (1998) 285–293.
- [65] “Computer Architecture,” *Encyclopedia of Biostatistics*, Wiley: New York. (1998).
- [66] “Is geographic variation in hip fracture rates related to current or former state of residence?” (DS Lauderdale, RA Thisted, J Goldberg) *Epidemiology*, **9**(5), (1998) 574–577.
- [67] “Tryptase levels are not increased during vancomycin-induced anaphylactoid reactions” (CL Renz, D Laroche, JD Thurn, HA Finn, JP Lynch, R Thisted, J Moss) *Anesthesiology*, **89**, (1998) 620–625.
- [68] “Clinical trials in general surgical journals: are methods better reported?” (LP Schumm, JS Fisher, RA Thisted, J Olak) *Surgery*, **125**(1), (1999) 41–45.
- [69] “Comparing methods of clinical measurement: Reporting standards for Bland and Altman analysis” (S Mantha, MF Roizen, LA Fleischer, R Thisted, J Foss) *Anesthesia & Analgesia*, **90** (2000) 593–602.
- [70] “New scoring system identifies kidney outcome with radiation therapy in acute renal allograft rejection” (Chen LM, Godinez J, Thisted RA, Woodle ES, Thistlewaite JR, Powers C, Haraf D) *Int J Radiat Oncol Biol Phys*, **46**(4) (2000) 999–1003.
- [71] “A meta-analysis and overview of the literature on treatment options for left-sided ulcerative colitis and ulcerative proctitis” (Cohen RD, Woseth DM, Thisted RA, Hanauer SB) *Am J Gastroenterol*, **95**(5) (2000) 1263–76.
- [72] “The impact of contralateral breast cancer on the outcome of breast cancer patients treated with mastectomy,” (I Abdalla, R Thisted, R Heimann) *Cancer J Sci Am*, **6**(4) (2000) 266–72.
- [73] “SPECT perfusion imaging in the diagnosis of Alzheimer’s disease: A clinical-pathologic study,” (W Jagust, R Thisted, MD Devous, Sr., R Van Heertum, H Mayberg, K Jobst, AD Smith, N Borys), *Neurology*, **56**(7), (2001), 950–6.

- [74] “Clinical efficacy of topical docosanol 10% cream for herpes simplex labialis: A multicenter, randomized, placebo-controlled trial,” (SL Sacks, RA Thisted, TM Jones, RA Barbarash, DJ Mikolich, GE Ruoff, JL Jorizzo, LB Gunnill, DH Katz, MH Khalil, PR Morrow, GJ Yakatan, LE Pope, JE Berg), *J Am Acad Dermatol*, **45**(2), (2001), 222–30.
- [75] “BIS monitoring to prevent awareness during general anesthesia,” (MF O’Connor, SM Daves, A Tung, RI Cook, R Thisted, J Apfelbaum), *Anesthesiology*, **94**(3), (2001), 520–2.
- [76] “Impact of Interpreter Services on Delivery of Health Care to Limited-English-proficient Patients,” (E Jacobs, DS Lauderdale, D Meltzer, J Shorey, W Levinson R Thisted) *JGIM*, **16** (2001) 468–74.
- [77] “Bone mineral density and fracture among prevalent kidney stone cases in the Third National Health and Nutrition Examination Survey,” (DS Lauderdale, RA Thisted, M Wen, MJ Favus), *Journal of Bone Mineral Research*, **16**(10), (2001), 1893–8.
- [78] “The effects of morphine on human articular cartilage of the knee: an in vitro study,” (JW Jaureguido, JF Wilcox, RA Thisted, C Phillips, B Cunningham, B Reider), *Arthroscopy*, **18**(6), (2002), 631–6.
- [79] “Are There Social Determinants of Health?” (RA Thisted), *Perspectives in Biology and Medicine*, **46**(3 Suppl), (2003 Summer), S65–S73.
- [80] “Exercise Capacity and the Risk of Death in Women: The St James Women Take Heart Project,” (M Gulati, DK Pandey, MF Arnsdorf, DS Lauderdale, RA Thisted, RH Wicklund, AJ Al-Hani, HR Black), *Circulation* **108**(13), (2003), 1554–9.
- [81] “Causes and Consequences of Kidney Loss in Patients with Nephrolithiasis,” (E Worcester, JH Parks, MA Josephson, RA Thisted, FL Coe), *Kidney International*, **64**(6), (2003), 2204–13.
- [82] “Postoperative Maintenance of Crohn’s Disease Remission With 6-Mercaptopurine, Mesalamine, or Placebo: A 2-Year Trial,” (SB Hanauer, BI Korelitz, P Rutgeerts, MA Peppercorn, RA Thisted, RD Cohen, DH Present). *Gastroenterology*, **127**, (2004), 723–729.
- [83] “Treatment of Pseudobulbar Affect in ALS with Dextromethorphan/Quinidine: A Randomized Trial,” (BR Brooks, RA Thisted, SH Appel, WG Bradley, RK Olney, JE Berg, LE Pope, RA Smith), *Neurology*, **63**, (2004), 1364–1370.
- [84] “Measuring Pseudobulbar Affect in ALS,” (RA Smith, JE Berg, LE Pope, RA Thisted), *Amyotrophic Lateral Sclerosis and Other Motor Neuron Disorders*, Sep;5 Suppl 1: (2004) 99–102.
- [85] “Validation of the CNS Emotional Lability Scale for pseudobulbar affect (pathological laughing and crying) in multiple sclerosis patients,” (RA Smith, JE Berg, LE Pope, JD Callahan, D Wynn, RA Thisted), *Multiple Sclerosis*, **10**, (2004), 679–685.
- [86] “The Effect of Physician Disclosure of Financial Incentives on Trust,” (W Levinson, A Kao, AM Kuby, RA Thisted), *Archives of Internal Medicine*, **165**(6): 625–630, (2005).
- [87] “Distinct temporal phases in the behavioral pharmacology of LSD: dopamine D₂ receptor-mediated effects in the rat and implications for psychosis,” (D Marona-Lewicka, RA Thisted, DE Nichols), *Psychopharmacology (Berl)*, **180**: 427–435, (2005).
- [88] “The Prognostic Value of a Nomogram for Exercise Capacity in Women,” (M Gulati, HR Black, LJ Shaw, MF Arnsdorf, CNB Merz, MS Lauer, TH Marwick, DK Pandey, RH Wicklund, RA Thisted), *New England Journal of Medicine*, **353**(5): 468–475, (2005).
- [89] “Prognostic Value of the Duke Treadmill Score in Asymptomatic Women,” (M Gulati, MF Arnsdorf, LJ Shaw, DK Pandey, RA Thisted, D Lauderdale, R Wicklund, AJ Al-Hani, HR Black), *American Journal of Cardiology*, **96**: 369–375, (2005).
- [90] “Not All Patients Want to Participate in Decision-Making. A National Study of Public Preferences,” (W Levinson, A Kao, A Kuby, RA Thisted), *Journal of General Internal Medicine*, **20**(6): 531–535, (2005).
- [91] “Breastfeeding history and overweight in Latino preschoolers,” (M Kersey, R Lipton, M Sanchez-Rosado, J Kumar, R Thisted, J Lantos), *Ambulatory Pediatrics*, **5**(6): 355–358, (2005).
- [92] “Randomized Controlled Trial of Dextromethorphan/Quinidine for Pseudobulbar Affect in Multiple Sclerosis,” (H Panitch, R Thisted, R Smith, L Pope, J Berg), *Annals of Neurology*, **59**: 780–787, (2006).

- [93] “Loneliness as a specific risk factor for depressive symptoms in older adults: Cross-sectional and longitudinal analyses,” (JT Cacioppo, ME Hughes, LJ Waite, LC Hawkley, R Thisted), *Psychology and Aging*, **21**(1): 140–151, (2006).
- [94] “Dextromethorphan and Quinidine in Adult Patients With Uncontrolled Painful Diabetic Peripheral Neuropathy: A 29-Day, Multicenter, Open-Label, Dose-Escalation Study,” (RA Thisted, L Klaff, SL Schwartz, JP Wymer, NW Culligan, G Gerard, LE Pope, JE Berg), *Clinical Therapeutics*, **28**: 1607–1618, (2006).
- [95] “From social structural factors to perceptions of relationship quality and loneliness: The Chicago Health, Aging, and Social Relations Study,” (LC Hawkley, ME Hughes, LJ Waite, CM Masi, RA Thisted, JT Cacioppo), *J Gerontol B Psychol Sci Soc Sci.*, **63**(6): S375–S384, (2008). [PMCID: PMC2769562.]
- [96] “Loneliness predicts reduced physical activity: Cross-sectional & longitudinal analyses,” (LC Hawkley, RA Thisted, JT Cacioppo), *Health Psychology*, **28**(3): 354–63, (2009).[PMCID: PMC2791498.]
- [97] “VLDL best predicts aortic root atherosclerosis in LDL receptor deficient mice,” (PA Venderlaan, CA Reardon, RA Thisted, GS Getz), *J Lipid Res.*, **50**(3): 376–85, (2009). [PMCID: PMC2638101.]
- [98] “Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study,” (JT Cacioppo, LC Hawkley, RA Thisted), *Psychology and Aging*, **25**(2): 453–63, (2010). [PMCID: PMC2922929.]
- [99] “Loneliness predicts increased blood pressure: Five-year cross-lagged analyses in middle-aged and older adults,” (LC Hawkley, RA Thisted, CM Masi, JT Cacioppo), *Psychology and Aging*, **25**(1): 132–141, (2010). [PMCID: PMC2841310.]
- [100] “The absorption hypothesis: learning to hear God in evangelical Christianity,” (TM Luhrmann, H Nusbaum, R Thisted), *American Anthropologist*, **112**(1): 66–78, (2010).
- [101] “Heart Rate Response to Exercise Stress Testing in Asymptomatic Women: The St. James Women Take Heart Project,” (M Gulati, LJ Shaw, RA Thisted, HR Black, CN Bairey Merz, MF Arnsdorf), *Circulation*, **122**: 130–137, (2010).
- [102] “Dextromethorphan Plus Ultra-Low-Dose Quinidine Reduces Pseudobulbar Affect,” (EP Pioro, BR Brooks, J Cummings, R Schiffer, R Thisted, D Wynn, A Hepner, R Kaye, for the Safety, Tolerability And Efficacy Results Trial of AVP-923 in PBA Investigators), *Annals of Neurology*, **68**(5): 693–702, Nov. (2010).
- [103] “A marginal structural model analysis for loneliness: Implications for intervention trials and clinical practice,” (Vanderweele TJ, Hawkley LC, Thisted RA, Cacioppo JT), *J Consult Clin Psychol*, **79**(2): 225–35, Apr (2011). [PMCID: PMC3079447.]
- [104] “Efficacy and Safety of Dextromethorphan/Quinidine at Two Dosage Levels for Diabetic Neuropathic Pain: A Double-Blind, Placebo-Controlled, Multicenter Study,” (AI Shaibani, LE Pope, R Thisted, A Hepner), *Pain Medicine*, **13**(2): 243–54, Feb (2012).
- [105] “A systematic analysis of experimental immunotherapies on tumors differing in size and duration of growth,” (FT Wen, R Thisted, DA Rowley, H Schreiber), *OncoImmunology*, **1**(2): 172–178, Mar. (2012). [PMCID: PMC3377001.]
- [106] “QTc Prolongation Predicts Survival in Pulmonary Hypertension,” (JD Rich, T Thenappan, B Freed, AR Patel, RA Thisted, R Childers, SL Archer), *Int J Cardiology*, **167**(3): 669–676, (2013 Aug 10). DOI:10.1016/j.ijcard.2012.03.071. [PMCID: PMC3389574.]
- [107] “Sleep duration and all-cause mortality: a critical review of measurement and associations,” (LM Kurina, MK McClintock, J Chen, LJ Waite, R Thisted, DS Lauderdale), *Annals of Epidemiology*, **23**(6): 361–70, (2013). DOI:10.1016/j.annepidem.2013.03.015. [PMCID: PMC3660511.]

- [108] “‘Lord, teach us to pray’: Prayer practice affects cognitive processing,” (TM Luhrmann, H Nusbaum, R Thisted), *Journal of Cognition and Culture*, 13: 159–177, (2013).
- [109] “Hemicraniectomy and Durotomy Upon Deterioration From Infarction-Related Swelling Trial (HeADDFIRST),” (JI Frank, LP Schumm, K Wroblewski, D Chyatte, AJ Rosengart, C Kordecki, RA Thisted), *Stroke*, 45(3): 781–7, (2014). [PMCID: NIHMS557621.]
doi:10.1161/STROKEAHA.113.003200.
- [110] “Assessment of Sleep in the National Social Life, Health, and Aging Project,” (DS Lauderdale, LP Schumm, LM Kurina, M McClintock, RA Thisted, J-H Chen, L Waite), *J Gerontol B Psychol Sci Soc Sci*, 69 (Suppl 2): S125–33, (2014). doi:10.1093/geronb/gbu092. [PMCID: PMC4303091.]
- [111] “Insomnia Symptoms and Actigraph-Estimated Sleep Characteristics in a Nationally Representative Sample of Older Adults,” (J-H Chen, L Waite, LM Kurina, RA Thisted, M McClintock, DS Lauderdale), *Journals of Gerontology. Series A: Biological Sciences and Medical Sciences*, 70(2): 185–92, (2015). doi:10.1093/gerona/glu144. [PMCID: PMC4366601.]
- [112] “Predicting the EQ-5D-3L Preference Index from the SF-12 Health Survey in a National US Sample: A Finite Mixture Approach,” (MC Perraillon, YT Shih, RA Thisted), *Medical Decision Making*, 35: 888–901, (2015). doi:10.1177/0272989X15577362. [PMCID: PMC4574086.]
- [113] “Actigraphic sleep characteristics among older Americans,” (L Kurina, RA Thisted, JH Chen, MK McClintock, LJ Waite) *Sleep Health*, 1(4): 285–292, (2015).
- [114] “Sleep duration and health among older adults: associations vary by how sleep is measured,” (DS Lauderdale, J-H Chen, LM Kurina, L Waite, RA Thisted), *Journal of Epidemiology & Community Health*, 70(4): 361–366 (2016). doi:10.1136/jech-2015-206109. [PMCID: PMC4788566.]
- [115] “Antibiotic and Duration of Perioperative Prophylaxis Predicts Surgical Site Infection in Head and Neck Surgery,” (A Langerman, R Thisted, S Hohmann, M Howell), *Otolaryngol Head Neck Surg*, 154(6): 1054–1063 (2016). doi:10.1177/0194599816634303
- [116] “Electronic Syndromic Surveillance for Influenza-Like-Illness Across Treatment Settings,” (JP Ridgway, D Lauderdale, R Thisted, A Robicsek), *Infection Control & Hospital Epidemiology*, 38(4): 393–398 (2017). doi:10.1017/ice.2016.299
- [117] “Effects of Driving Distance and Transport Time on Mortality Among Level I and II Traumas Occurring in a Metropolitan Area,” (TG Garrison, LP Schumm, M Kocherginsky, R Thisted, DR Dirschl, S Rogers), *Journal of Trauma and Acute Care Surgery*, 85: 756–765 (2018). doi:10.1097/TA.0000000000002041

Computer Software and Data Bases

- [S1] *The Literary Detective* (SA Kurtz, RA Thisted). Version 0.14. Computer software for Macintosh computers. The University of Chicago: Chicago, Illinois. 1989.
- [S2] *Current Index to Statistics/Extended Database, 1993 Edition*. (BE Trumbo, RA Thisted, Eds). Bibliographic database of the statistical literature on CD-ROM. American Statistical Association and Institute of Mathematical Statistics. 1993.
- [S3] *Current Index to Statistics/Extended Database, 1994 Edition*. (RA Thisted, Editor; B Trumbo, M Wichura, Eds). CD-ROM. American Statistical Association and Institute of Mathematical Statistics. 1994.
- [S4] *Current Index to Statistics/Extended Database, 1995 Edition*. (RA Thisted, Michael Wichura, Eds). CD-ROM. American Statistical Association and Institute of Mathematical Statistics. 1995.
- [S5] *Current Index to Statistics/Extended Database, 1996 Edition*. (Michael Wichura, Ronald Thisted, Klaus Hinkelmann, Eds). CD-ROM. American Statistical Association and Institute of Mathematical Statistics. 1996.
- [S6] *Current Index to Statistics/Extended Database, 1997 Edition*. (Michael Wichura, Ronald Thisted, Klaus Hinkelmann, Eds). CD-ROM. American Statistical Association and Institute of Mathematical Statistics. 1997.

- [S7] *Current Index to Statistics/Extended Database, Release 7.* (Michael Wichura, Ronald Thisted, Klaus Hinkelmann, Eds). *CD-ROM*. American Statistical Association and Institute of Mathematical Statistics. 1998.
- [S8] *Current Index to Statistics/Extended Database, Release 8.* (Michael Wichura, Ronald Thisted, Klaus Hinkelmann, Eds). *CD-ROM*. American Statistical Association and Institute of Mathematical Statistics. 2000.

Book Chapters, Comments, Reviews, and Other Publications

- [M1] Comment on “A Simulation Study of Alternatives to Ordinary Least Squares,” by Dempster, Schatzoff, and Wermuth, *Journal of the American Statistical Association*, **72**, (1977), 77–106.
- [M2] *Operations Research: Principles and Practice*, by Phillips, Ravindran, and Solbert. (Book Review) *Journal of the American Statistical Association*, **72**, (1977), 692–693.
- [M3] *Statistical Methods for Digital Computers*, by Enslein, Ralston, and Wilf. (Book review) *Computing Reviews*, **20**, (1979), 309–312.
- [M4] Comment on “A Critique of Some Ridge Regression Methods,” by Smith and Campbell, *Journal of the American Statistical Association*, **75**, (1980), 81–86.
- [M5] “The Effect of Personal Computers on Statistical Practice”. *Computer Science and Statistics: Thirteenth Symposium on the Interface*, W. F. Eddy, ed. (1981), 25–30.
- [M6] “Decision-Theoretic Regression Diagnostics.” *Statistical Decision Theory and Related Topics III*, **2** (1982), S. S. Gupta and J. Berger, eds. Academic Press: New York, 363–382.
- [M7] “A Remark on AS 127: Generation of Random Orthogonal Matrices” (M Tanner, R Thisted). *Applied Statistics*, **31**, (1982), 190–192.
- [M8] “Treatment of Depression,” (Letter) *Journal of the American Medical Association*, **249:18**, (1983), 2457–2458.
- [M9] “An Appraisal of Statistical Graphics,” in *Statistics: An Appraisal*, H. A. David and H. T. David, eds., Iowa State University Press, (1984), 605–624.
- [M10] *Statistical Software: A Comparative Review*, by Ivor Francis. (Book Review) *SIAM Review*, **26**, (1984), 294–297.
- [M11] “Hacking Away at Morality,” (Letter) *Communications of the ACM*, **27**, (1984), 8. [“Privacy” should read “piracy.” Editorial correction, **27**, (1984), 176.]
- [M12] “The Use of Computers in Statistical Research,” (WF Eddy, PJ Huber, DE McClure, DS Moore, W Stuetzle, R Thisted). Report of an Institute of Mathematical Statistics Panel. (1986). Reprinted as Eddy, WF. “Computers in Statistical Research,” *Statistical Science*, **1(4)**, 1986, 419–437.
- [M13] “Knowledge Representation For Expert Data Analysis Systems,” in *Computer Science and Statistics: 17th Symposium on the Interface*, DM Allen, ed. North-Holland (1986), 43–48.
- [M14] “Representing Statistical Knowledge and Search Strategies for Expert Data Analysis Systems,” Chapter 11 in *Artificial Intelligence and Statistics*, William A. Gale, editor. (1986) Addison-Wesley: Reading, Massachusetts. 267–284.
- [M15] “Tools for Data Analysis Management,” in *Computer Science and Statistics: Eighteenth Symposium on the Interface*, Thomas Boardman, Editor. (1986) American Statistical Association: Washington, 152–159.
- [M16] “Sources of Error in Graphical Perception: A Critique and an Experiment” (M Morris, R Thisted). *Proceedings of the Section on Statistical Graphics*. (1986). American Statistical Association: Washington, 43–48.
- [M17] *Elements of Graphing Data*, by William S. Cleveland. (Book review) *Computing Reviews*, (1986), 179–180.
- [M18] Comment on “Collinearity and least squares regression,” by G. W. Stewart, *Statistical Science* **2**, (1987), 91–93.
- [M19] *Statistical Image Processing and Graphics*, Edward J. Wegman and Douglas J. DePriest, editors. (Book review) *Technometrics* **30**, (1988), 126–127.

- [M20] *Graphical Exploratory Data Analysis*, by S. H. C. du Toit, A. G. W. Steyn, and R. H. Stumpf. (Book review) *Journal of the American Statistical Association*, **84**, (1989), 614.
- [M21] “Distribution of Editorial-Board Membership for Statistics Journals,” (Letter) *The American Statistician*, **45**, (1991), 170–171.
- [M22] *Linear Least Squares Computations*, by R. W. Farebrother. (Book review) *Technometrics*, **33**, (1991), 368–369.
- [M23] “Complications of Patients Undergoing Lumbar Discectomy in Community Hospitals,” (L Ramirez, R Thisted). chapter in *Complications of Spinal Surgery*, Edward Tarlov, ed., American Association of Neurological Surgeons: Park Ridge, (1991).
- [M24] “Computers and Modern Statistics,” (RA Thisted, PF Velleman). Chapter 3 in *Perspectives on Contemporary Statistics*, David Hoaglin and David F. Moore, eds. Mathematical Association of America: Washington. (1992).
- [M25] “Interdisciplinary Statistics Education.” In *Modern Interdisciplinary University Statistics Education: Proceedings of a Symposium*, Committee on Applied and Theoretical Statistics, National Research Council (1994), 110–116.
- [M26] *Artificial Intelligence Frontiers in Statistics*, D. J. Hand, editor. (Book review) *Journal of the American Statistical Association*, **89**, (1994), 719–720.
- [M27] “Incidence of postdural puncture headache in morbidly obese parturients [letter],” (E Faure, R Moreno, R Thisted). *Regional Anesthesia*, **19(5)**, (1994), 361–363.
- [M28] “On ‘Smoking is not a predictor of mortality and morbidity following coronary artery bypass grafting’ by JR Utley, et al.” (Invited Commentary) (J Olak, R Thisted) *Journal of Cardiac Surgery*, **11**, (1996) 385–6.
- [M29] “Re: Long-term survival and mortality in prostate cancer treated with noncurative intent [letter; comment],” (GW Chodak, RA Thisted), *Journal of Urology*, **155**(6), (1996), 2039; discussion 2039–41.
- [M30] Comment on “The Gaussian Hare and the Laplacian Tortoise: Computability of Squared-Error versus Absolute-Error Estimators,” by Stephen Portnoy and Roger Koenker, *Statistical Science*, **12**, (1997), 296–298.
- [M31] “6-Mercaptopurine and Mesalamine for prevention of relapse after conservative surgery for Crohn’s Disease,” [Reply to Letter] (SB Hanauer, R Cohen, RA Thisted, P Rutgeerts, DH Present, BI Korelitz), *Gastroenterology*, **128**(1), (2005), 249–251.
- [M32] “Treatment of Crohn’s disease: the ‘Long’ of it,” [Editorial] (SB Hanauer, RA Thisted), *Gastroenterology*, **128**(7), (2005), 2164–6.
- [M33] “Baseline Adjustment: Issues for Mixed-Effect Regression Models in Clinical Trials,” *ASA Proceedings of the Joint Statistical Meetings*, 386–391. American Statistical Association (Alexandria, VA). (2006).
- [M34] “Happiness and the invisible threads of social connection: The Chicago Health, Aging, and Social Relations Study.” (JT Cacioppo, LC Hawkley, A Kalil, ME Hughes, L Waite, RA Thisted). Chapter 10 in *The Science of Subjective Well-Being*, Michael Eid and Randy J. Larsen, eds. Guilford Press: New York. (2008), 195–219.
- [M35] “Multilevel investigations: Conceptual mappings and perspectives.” (JT Cacioppo, GG Berntson, RA Thisted). Chapter 17 in *Biosocial Surveys*, Committee on Advances in Collecting and Utilizing Biological Indicators and Genetic Information in Social Science Surveys. M Wienstein, JW Vaupel, and KW Wachter, eds. The National Academy Press: Washington, DC (2008), 367–380.
- [M36] “Epilogue.” Chapter 16 in *Invisible Forces and Powerful Beliefs: Gravity, Gods, and Minds*, The Chicago Social Brain Network. FT Press Science: Upper Saddle River, NJ. (2010) 197–205.

Selected Grants and Contracts

R01 HD069500 Lauderdale, D (PI) 7/1/2011–8/31/2014 (NIH/NIA)

Social Relationships, Economic Shocks, Sleep and Wellbeing Among Older Adults

Role: Co-Investigator, Biostatistician

P30 CA14599 Le Beau, M. (PI) 05/1/08–03/31/18 (NIH/NCI)

UCCRC-Cancer Center Support Grant; Subproject: Biostatistics Facility

Role: Scientific Director of Biostatistics

UL1 TR000430 Solway, J. (PI) 9/17/07–05/31/17 (NIH)

Clinical and Translational Science Award

Roles: Population Sciences Cluster Director, Clinical Research Training Program Co-Director

U01 DK62429 Cho, J (PI) 9/30/02–8/31/21 (NIH/NIDDK)

IBD Genetics Consortium Data Coordinating Center

Role: Director, Data Management Core (Site PI)

HHSA 290-2007-10058 Meltzer, D (PI) 10/26/09–10/25/12 (AHRQ/ARRA/BCBS)

American Recovery and Reinvestment Act of 2009: Comprehensive EPC Comparative Effectiveness Reviews for Effective Health Care

Role: Statistical consultant

R34 AI080962 Solway, J (PI) 9/4/08–8/31/09 (NIH/NIAID)

Evaluation of Lovastatin in Severe Persistent Asthma (ELiSPA)

Role: Co-Investigator, Biostatistician

5K30 HL04093-02 Coe, F. (PI) 6/1/99–9/27/07 (NIH)

Clinical Research Training Program

Roles: Program Co-Director, Seminar Director

P01 AG18911 Cacioppo, J. (PI) 7/1/01–6/30/06 (NIH)

Social Isolation, Health and the Aging Process; Biostatistical Core B

Role: Director, Biostatistics Core

R01 CA92443-01 Meltzer, D. (PI) 9/1/01–8/31/04 (NIH)

Cost-Effectiveness of Prostate Cancer Screen/Treatment

Role: Advisory Panel

R01 HS09982 Thisted, R. (PI) 9/15/99–8/31/03 (AHRQ)

Patient Preferences for Disclosure: A National Survey

Role: Principal Investigator (vice Levinson), Statistician

R01 NS40229 Frank (PI) 9/18/99–6/30/03 (NIH)

Hemicraniectomy for Swelling from Cerebral Infarction

Role: Director, Data Coordinating Center

Cassell, C. (PI) 7/1/93–6/30/95

Thisted, R. (PI) 7/1/95–6/30/98

Levinson, W. (PI) 7/1/98–6/30/01

Lantos, J. (PI) 7/1/02–6/30/06 (Robert Wood Johnson Foundation)

Clinical Scholars Program

Role: Co-PI to 1998, Co-Director to 1999; Core-Faculty; Advisory Board

Teaching

Recent Courses Taught

2014 Health Studies 310: Epidemiologic Methods
Health Studies 333: Longitudinal Data Analysis
Health Studies 307: Clinical Epidemiology (Lecture: Meta-Analysis)
Essentials of Patient-Oriented Research (Lecture: Study Design)

2013 Health Studies 307: Clinical Epidemiology (Lecture: Experimental Study Design)
Essentials of Patient-Oriented Research (Lecture: Study Design)
Health Studies 333: Longitudinal Data Analysis

2012 Health Studies 307: Clinical Epidemiology
Health Studies 333: Longitudinal Data Analysis
Seminar in Clinical Research Methods (20 weeks)
Medicine 777: Advanced Clinical Pharmacology (Lecture: Pharmacoepidemiology)

2011 Health Studies 329: Introduction to Clinical Trials
Health Studies 333: Longitudinal Data Analysis
Seminar in Clinical Research Methods (30 weeks)
Medicine 777: Advanced Clinical Pharmacology (Lecture: Pharmacoepidemiology)

2010 Health Studies 327: Biostatistical Methods
Health Studies 333: Longitudinal Data Analysis
Seminar in Clinical Research Methods (30 weeks)
Medicine 777: Advanced Clinical Pharmacology (Lecture: Pharmacoepidemiology)

2009 Health Studies 327: Biostatistical Methods
Seminar in Clinical Research Methods (30 weeks)
Medicine 777: Advanced Clinical Pharmacology (Lecture: Pharmacoepidemiology)
Family Medicine 304: Epidemiology and Clinical Investigation (Lecture: Screening Tests)

2008 Health Studies 327: Biostatistical Methods
Seminar in Clinical Research Methods (30 weeks)
Statistics 307/Computer Science 378: Numerical Computation

2007 Health Studies 327: Biostatistical Methods
Seminar in Clinical Research Methods (30 weeks)
Medicine 777: Advanced Clinical Pharmacology (Lecture: Pharmacoepidemiology)
Statistics 307/Computer Science 378: Numerical Computation

2006 Health Studies 327: Biostatistical Methods
Seminar in Clinical Research Methods (30 weeks)
Medicine 777: Advanced Clinical Pharmacology (Lecture: Pharmacoepidemiology)

2005 Statistics 307: Numerical Computation
Seminar in Clinical Research Methods (30 weeks)

2004 Health Studies 327: Biostatistical Methods
Health Studies 541: Epidemiology and Clinical Investigation
(Lecture: Chronic Disease Epidemiology)
Medicine 777: Advanced Clinical Pharmacology (Lecture: Pharmacoepidemiology)
Medicine 603: Critical Appraisal of Medical Literature (Lecture: Statistical issues)
Seminar in Clinical Research Methods (30 weeks)

2003 Health Studies 541: Epidemiology and Clinical Investigation
Health Studies 327: Biostatistical Methods
Medicine 777: Advanced Clinical Pharmacology (Lecture on Pharmacoepidemiology)

Medicine 603: Critical Appraisal of Medical Literature (Lecture: Statistical issues)
Seminar in Clinical Research Methods (30 weeks)

2002 Health Studies 541: Epidemiology and Clinical Investigation
Medicine 777: Advanced Clinical Pharmacology (Lecture on Pharmacoepidemiology)
Medicine 603: Critical Appraisal of Medical Literature (Lecture: Statistical issues)
Seminar in Clinical Research Methods (30 weeks)

2001 Health Studies 541: Epidemiology and Clinical Investigation
Statistics 224: Applied Regression Analysis
Medicine 777: Advanced Clinical Pharmacology (Lecture on Pharmacoepidemiology)
Medicine 603: Critical Appraisal of Medical Literature (Lecture: Statistical issues)
Seminar in Clinical Research Methods (30 weeks)

2000 Health Studies 541: Epidemiology and Clinical Investigation
Statistics 224: Applied Regression Analysis
Medicine 777: Advanced Clinical Pharmacology (Lecture on Pharmacoepidemiology)
Seminar in Clinical Research Methods (30 weeks)

1999 Statistics 307: Numerical Computation
Statistics 226: Categorical Data Analysis
Seminar in Clinical Research Methods (15 weeks)

Refereeing, 2005–

Annals of Statistics

Annals of Applied Statistics

Regulatory Pharmacology and Toxicology

JAMA Oncology

JAMA Psychiatry

Journal of Clinical Oncology

Journal of Surgical Research

Neuropsychopharmacology

Perspectives in Biology and Medicine

PLoS ONE

Statistics in Medicine

NIH, Center for Scientific Review (Surgery, Anesthesiology and Trauma study section)

NIH, Center for Scientific Review (Challenge Grant Editorial Panel HDM-P)

NSF, Division of Mathematical Sciences

Research Grants Council of Hong Kong

University Committees

Current appointments:

Emeriti Faculty Steering Committee, 2019–.
University Benefits Committee, 2019–.

Previous appointments (since 1982):

Working Group on Innovation, Transparency, Conflict of Interest, 2015–2018.
ad hoc Compliance Committee, 2014–2018.
Standing Committee on Academic Fraud, 2014–2018.
Standing Committee on Individual Conflict of Interest 2015–2018.
Steering Committee, Spring 2016 Climate Survey on Diversity and Inclusion, 2015–2016.
ad hoc Committee for the Spring 2015 Climate Survey on Sexual Misconduct, 2015.
Executive Committee, Center for Cognitive and Social Neuroscience, 2007–2015.
Executive Committee, Institute of Translational Medicine (CTSA), 2007–2015.
Committee on Appointments and Promotions, Biological Sciences Division, 2014.
Data Stewardship Committee, University of Chicago Medicine, 2013–2014.
Health Professions Faculty Advisory Committee, 2013–2014.
Center for Research Informatics Oversight Committee, 2011–2014.
Research Advisory Committee, University of Chicago Medicine, 2010–2014.
Research Planning Review Committee, University of Chicago Medicine, 2012–2013.
Committee of Basic Science Chairs, Biological Sciences Division, 1999–2012.
Executive Committee, Clinical Research Training Program, 1999–2012.
University of Chicago Medical Center, Budget Oversight Committee, 2007–2010.
Executive Committee, Division of Biological Sciences, 2000–2009.
ad hoc Faculty Science Review Committee, 2009.
Committee of Clinical Chairs, Biological Sciences Division, 1999–2006.
Advisory Committee, Robert Wood Johnson Clinical Scholars Program, 1999–2006.
Executive Committee, University of Chicago Cancer Research Center, 2000–2005.
Search Committee (Chair), Chairman of Department of Psychiatry, 2003–2004.
Committee to Review Appointment and Promotion Criteria (BSD), 2003–2004.
Tenure and Tracks Committee (BSD), 2003–2004.
Committee to Advise the Provost on Federal Wide Assurance (Chair), 2003.
Research Aims Committee, Division of Biological Sciences, 2002–2003.
Search Committee, Chairman of Department of Obstetrics & Gynecology, 2000–2003.
Committee to Advise the President on the Dean of the Biological Sciences Division, 2001–2002.
Search Committee (Chair), Chairman of Department of Family Medicine, 2000–2002.
Provost's Committee on Medical Informatics, 2000–2001.
Clinical Translational Advisory Group, Biological Sciences Division, 1999–2001.
Co-chair, Committee on Law and Medicine, BSD and Law School, 1999–2000.
Working Group on Clinical Data Sharing, 1999–2001.
Executive Committee, Department of Anesthesia & Critical Care, 1994–1998.
Institutional Review Board, Division of Biological Sciences, 1983–1986, 1987–1997.
Faculty Campus Planning Committee, 1993–1996.
College Curriculum Committee, 1990–1996.
Board of Computing Activities and Services 1981–1986, 1991–1994.
Physical Sciences Division, Space/Facilities Committee, 1992–1994.
Committee on Family Practice (BSD), 1993.
Provost's Committee on Health Studies, 1993.

Health Studies Committee (BSD), 1991–1992.
College Council, 1979–1982, 1983–1986, 1989–1992.

**Harvard Medical School
Curriculum Vitae**

Date Prepared: December 30, 2024

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Work Phone: 617-732-7420

Work Email: bwertheim@bwh.harvard.edu

Work FAX: 617-732-7421

Education

2007	BS <i>(summa cum laude)</i>	Biochemistry	Lafayette College, Easton, PA
2011	MD	Medicine	Harvard Medical School (HMS), Boston, MA

Postdoctoral Training

6/11-6/14	Intern/Resident	Internal Medicine	Massachusetts General Hospital (MGH), Boston, MA
6/11-6/14	Clinical Fellow	Medicine	HMS
7/14-6/17	Clinical Fellow	Pulmonary and Critical Care Medicine	Brigham and Women's Hospital (BWH), Boston, MA
7/14-6/19	Research Fellow	Medicine (Bradley Maron, MD; Joseph Loscalzo MD, PhD)	BWH
7/15-6/16	Fellow	Burke Advanced Fellowship in Pulmonary Heart Disease	BWH

Faculty Academic Appointments

7/19-3/2024	Instructor	Medicine	HMS
3/24-	Assistant Professor	Medicine	HMS

Appointments at Hospitals/Affiliated Institutions

11/16-	Intensivist	Medicine	Newton Wellesley Hospital, Newton, MA
7/17-	Associate Physician	Pulmonary and Critical Care Medicine	BWH
9/23-	Physician	Pulmonary and Critical Care Medicine	VA Boston Healthcare System, Boston, MA

Other Professional Positions

2017	Consultant, Excellence On-Demand Education Curriculum	Cornell School of Hotel Administration Service (Unpaid)
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2020-2022 Medical Consultant Change Healthcare, Newton, MA

Major Administrative Leadership Positions

Local

2023- Co-Director, Pulmonary Vascular Disease Section VA Boston, Healthcare System, Boston MA

Committee Service

Local

2007-2011	Student Government Financial Aid	HMS Representative
2011-2014	Laboratory Utilization Committee	MGH Member
2011-2014	Internal Medicine Resident Quality and Safety Committee	MGH
2012	Accreditation Council for Graduate Medical Education Site Visit	Member MGH
2012	Medical Intensive Care Unit (MICU) Phenobarbital Protocol for Complicated Alcohol Withdrawal Project	Member (voted by peers) W. Roxbury VA Medical Center
2016-2017	BWH MICU Vascular Access Cart Project	Member BWH Physician Co-Leader
2017	Accreditation Council for Graduate Medical Education Site Visit	Pulmonary and Critical Care Medicine, BWH
2017	Mass General Brigham (MGB) Center for COVID Innovation Healthcare Subcommittee	Member (voted by peers) MGB
2020-	Pulmonary and Critical Care Medicine T32 Advisory Committee	Member BWH
2023-	Pulmonary Embolism Response Team Advisory Committee	Member Newton-Wellesley Hospital
		Member

Professional Societies

2011-2014	American College of Chest Physicians	Member
2017-	Pulmonary Vascular Research Institute	Member
2017-	American Thoracic Society	Member
2023-		Postgraduate Course in Right Heart Hemodynamics
2023-		Member, Pulmonary Circulation Programming Committee
2023-		Conference Co-Organizer, Pulmonary Circulation Committee
2019-	American Heart Association	Member, Junior International Scholars Network, Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation

2019-	Massachusetts Medical Society	Member
2023-	North American Thrombosis Forum	Conference Organizer, 6 th Biannual Right Heart Symposium. Selected to serve on the organizing committee for the 7 th Symposium scheduled for 2025.

Editorial Activities

Ad hoc Reviewer

American Journal of Medicine

American Journal of Respiratory and Critical Care Medicine

Annals of the American Thoracic Society

Chest

Circulation: Cardiovascular Imaging

Circulation: Heart Failure

Clinical Cardiology

European Respiratory Journal Open

Journal of Heart and Lung Transplantation

Journal of Hospital Medicine

Journal of the American College of Cardiology

Journal of the American College of Cardiology: Case Reports

Journal of the American Heart Association

New England Journal of Medicine Healer (NEJM video game)

Respiratory Research

Scientific Reports

Honors and Prizes

2003-2007	Trustee Scholarship	Lafayette College	
2004-2006	Excel Scholarship	Lafayette College	
2006	Sigma Xi	Lafayette College, Scientific Research Honor Society	Research
2007	Phi Lambda Upsilon	Lafayette College, Chemistry Honor Society	Academic
2007	Merck Index Award	Lafayette College	
2008-2010	Howard G. Lapsley Memorial Scholarship	Muhlenberg Foundation	
2017	Basic Science Fellowship Award	Pulmonary Vascular Disease Research Institute	Research
2018-2020	Selected for Divisional T32 Training Award (HL007633)	Division of Pulmonary and Critical Care Medicine, BWH	Research
2019	Hearst Young Investigator Award	BWH & Hearst Foundation	Research
2023	Core Laboratory Voucher Award	Department of Medicine, BWH	Research

Report of Funded and Unfunded Projects

Funding Information

Past

2017-2020	Mechanisms of Disease Inception in Pulmonary Arterial Hypertension Pulmonary Vascular Research Institute Principal Investigator (PI)
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	This project focused on characterizing the pathobiology of early pulmonary vascular fibrosis and identifying novel therapeutic targets specific to PAH disease inception.
2020-2021	Proline Bioavailability, Endothelial Fibrosis, and Early Pulmonary Arterial Hypertension BWH Hearst Young Investigator Award PI This project aimed to understand how interaction between C-terminal src kinase (Csk) and delta-1-pyrroline-5-carboxylate synthase (P5CS) controls pathogenic endothelial collagen synthesis in early-stage pulmonary arterial hypertension.
Current	
2020-2025	Ubiquitination and Endothelial Fibrosis in Early Pulmonary Arterial Hypertension National Institutes of Health (NIH)/National Heart, Lung and Blood Institute (NHLBI) 5K08HL151976-02 PI (\$785,000) This project proposes to investigate the role of redox-regulated endothelial C-terminal src kinase as a mediator of vascular fibrosis in early-stage pulmonary arterial hypertension (PAH).
2024-2026	Endothelial Proline Utilization in Pulmonary Arterial Hypertension NIH/NHLBI R03 PI – Direct Costs Requested - \$150,000 This grant aims to build on the observations we made in our 2023 <i>JCI Insight</i> paper that pulmonary arterial hypertension (PAH) is associated with increased avidity of the amino acid proline in pulmonary endothelial and medial cell types. We propose to 1) Establish Csk-Src regulation of HPAEC proline availability and fibroproliferative biomass <i>in vitro</i> and 2) Establish Csk-Src dependent proline dysregulation in experimental early-stage PAH and human PAH <i>in vivo</i> .

Projects Submitted for Funding

Submitted 2/2/2024	Endothelial Inflammation, Src Kinase Dysregulation, and Fibrosis in Early Pulmonary Arterial Hypertension NIH/NHLBI R01 PI – Direct Costs Requested - \$2,625,250 The central goal of this proposal is to identify the molecular mechanism regulating Csk dysfunction in early-stage pulmonary arterial hypertension and the functional consequences of this mechanism for pathologic collagen 22 synthesis in pulmonary arterioles. We propose to 1) Test the hypothesis that inflammation promotes Csk dysfunction and Src activation in HPAECs and 2) Define the pulmonary vascular phenotype of Csk-dependent collagen 22. Understanding Csk-Src dependent Col22A1 vasculopathy may identify strategies to target the inception of pulmonary vascular remodeling, which may have implications for PAH prevention in high-risk connective tissue disease patients. Scientific Review Group Action: Impact/Priority Score: 33
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Report of Local Teaching and Training

Teaching of Students in Courses

HMS/HSDM/DMS Courses

2015-2016	Human Systems: Respiratory Pathophysiology (IN757.RES) Medical Students	HMS	5 hrs/week for 2.5 weeks
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2016	Patient Doctor II Pulmonary Examination Medical Students (IN761)	HMS 3 hr session/yr
2016	Patient Doctor II Cardiovascular Examination Medical Students (IN761)	HMS 3 hr session/yr
2017-	The Practice of Medicine: Basic Pulmonary Examination Medical Students (POM100.23)	HMS 3 hr session/yr
2017-	The Practice of Medicine: Basic Cardiovascular Examination (POM100.23) Medical Students	HMS 3 hr session/yr
2018	Internal Medicine Bootcamp – Approaches to Shock and Central Line Training Medical Students	4 hr session/yr

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

2015	Perioperative Management of Pulmonary Hypertension Pulmonary and critical care medicine fellows	BWH 1 hr lecture
2016	ICU Management of Pulmonary Hypertension Surgical ICU residents and fellows	BWH 1 hr lecture
2019	Pulmonary Vascular Disease 1 st yr Pulmonary and critical care medicine fellows	BWH 1 hr lecture
2019 -	Introductory Course for Allergy and Immunology - Lung physiology, PFTs, and cases Allergy and Immunology clinical fellows	BWH 1 hr lecture x 4 yrs
2021, 2022, 2024	Introduction to Pulmonary Hypertension Pulmonary and critical care medicine fellows	BWH 1 hr lecture
2022-	Introduction to Pulmonary Hypertension Cardiovascular Medicine fellows	BWH 1 hr lecture
2023	Advanced Pulmonary Hypertension Management Pulmonary and critical care medicine fellows	BWH 1 hr lecture
2024	Pulmonary hypertension Internal medicine residents	BWFH 1 hr lecture
2024	Pulmonary Hypertension Cardiovascular Fellows	BWH 1 hr lecture
2024	Pulmonary Hypertension Internal medicine residents	BWH 1 hr lecture
2024	Critical care approach to right heart failure Internal medicine residents	BWFH 1 hr lecture

Clinical Supervisory and Training Responsibilities

2017-	Substitute ambulatory preceptor PCCM Fellows	BWH – Lung Center 4 hrs/yr
2017-	Inpatient ICU Preceptor Internal Medicine Residents	Newton Wellesley Hospital 12-24 hrs/month
2019-	Inpatient Pulmonary Vascular Disease (PWD) Consults Preceptor	BWH 45 hrs/week, 6 weeks/yr

	Internal Medicine Interns, Residents, and PCCM Fellows	
2020	Inpatient COVID ICU preceptor Internal Medicine Interns, Residents, and PCCM Fellows	BWH 40 hrs/week, 2 weeks/yr (and as needed pending pandemic trajectory)
2020-2023	BWH Intern Physician Coaching Program: Career Advisor Internal Medicine House staff	BWH 8 hrs/year
2020-	Ambulatory Subspecialty Preceptor: PVD Clinic	BWH
2020-	Internal Medicine Residents	5 hrs/session, 4 sessions/year
	Bedside Procedural Service	BWH
	Internal Medicine Interns, Residents, Physician Assistant Fellows	35 hrs/week, 1 week/year
2021-	Ambulatory Subspecialty Preceptor: PVD Clinic	BWH
	Cardiovascular medicine fellows	5 hrs/session, 8 sessions/year
2023-	Ambulatory Subspecialty Preceptor: PVD Clinic Burke Fellow in Pulmonary Heart Disease	West Roxbury VA Hospital 3 hrs/session, 15 sessions/year

Laboratory and Other Research Supervisory and Training Responsibilities

2017-	Research supervision Staff scientist	Maron Laboratory, BWH 3 hrs/week yearly until 2023. 34 hrs/week yearly 2023-
2021-	Research supervision Research fellow	Division of Pulmonary and Critical Care Medicine, BWH 0.5 hr/month
2022-2024	Research supervision Internal medicine resident	Division of Pulmonary and Critical Care Medicine, BWH 2 hrs/week

Mentored Trainees and Faculty

2017-2019	Elena Arons, MD / Staff Scientist, Division of Cardiovascular Medicine, BWH <i>Career Stage:</i> Staff scientist. <i>Mentoring Role:</i> Co-mentor. <i>Accomplishments:</i> conducted research on endothelial cell isolation, characterization, and culture; co-authored publication.
2021-	Ann Marcia Tukpah, MD / Clinical, Pulmonary and Critical Care Medicine, BWH; Research Fellow in Medicine, HMS <i>Career Stage:</i> Fellow. <i>Mentoring Role:</i> Research advisor on T32 committee. <i>Accomplishments:</i> accepted to BWH PCCM T32, submitted NIH loan repayment program application.
2022-2024	Michael S. Miller, MD / Resident, Internal Medicine, BWH <i>Career Stage:</i> Resident. <i>Mentoring Role:</i> Research mentor. <i>Accomplishments:</i> research project studying the association of phosphodiesterase inhibition and esophageal dysmotility in pulmonary arterial hypertension and the implications for lung transplantation evaluation. Manuscript published 4/2024, M.S.M. as first-author, B.M.W. as senior-author.

Formal Teaching of Peers (e.g., CME and other continuing education courses)

No presentations below were sponsored by outside entities

2019	Central Venous Catheter Placement	4-hour session
2020	Bedside Procedure Service Faculty Simulation, BWH	Boston, MA
	Pulmonary arterial hypertension: Clinical presentation, diagnosis, therapy, and prognosis	1-hour audio recorded lecture
	The Brigham Board Review in Pulmonary – “Studio”/Distance Learning Course, BWH	Boston, MA

2020	Challenging Pulmonary Cases Brigham and Women's Intensive Review of Internal Medicine, BWH	30-minute lecture Boston, MA
2020	Asthma Evaluation and Testing The Brigham Board Review in Allergy and Immunology: Studio/Distance Learning	30-minute lecture Virtual
2020	Pulmonary Board Review 5 th Annual Update in Pulmonary and Critical Care Medicine	30-minute lecture Boston, MA
2022	Pulmonary arterial hypertension: Clinical presentation, diagnosis, therapy, and prognosis The Brigham Board Review in Pulmonary – "Studio"/Distance Learning Course, BWH	1-hour audio recorded lecture Boston, MA

Local Invited Presentations

No presentations below were sponsored by outside entities

2015	Exercise-induced pulmonary hypertension / case presentation Pulmonary Vascular Disease Conference, BWH
2015	Air in the wrong part of the lung / Pulmonary Grand Rounds Pulmonary and Critical Care Medicine Division, BWH
2015	A legendary case of respiratory failure (from 1952) / Pulmonary Grand Rounds Pulmonary and Critical Care Medicine, BWH
2015	Case Presentation: Exercise-induced pulmonary hypertension / invited lecture Bornstein Cardiology Conference, BWH
2016	Extracorporeal life support for massive pulmonary embolism: case presentation and review of the literature / invited lecture Pulmonary Vascular Disease Conference, BWH
2016	Extracorporeal life support for massive pulmonary embolism: case presentation and review of the literature / invited lecture Bornstein Cardiology Conference, BWH
2017	Reverse-engineering pulmonary vascular disease: insights from borderline pulmonary arterial hypertension / invited lecture Pulmonary Vascular Disease Conference, BWH
2017	Pulmonary function testing for the thoracic radiologist / invited lecture Radiology Resident Teaching Conference, BWH
2017	Mechanisms of disease inception in pulmonary arterial hypertension / invited talk Pulmonary Vascular Disease Conference, BWH
2018	Mechanisms of disease inception in pulmonary arterial hypertension / invited talk Work-in-Progress, Pulmonary and Critical Care Medicine, BWH
2019	Mechanisms of disease inception in pulmonary arterial hypertension / invited talk Pulmonary and Critical Care Medicine, Work-in-Progress, BWH
2019	Pulmonary function testing / Allergy Grand Rounds MGH, Boston, MA
2019	Pulmonary hypertension in connective tissue disease: Managing the spectrum of clinical risk / Rheumatology Grand Rounds Rheumatology Division, BWH
2019	Pulmonary hypertension for the bedside nurse / invited talk Shapiro Cardiovascular Center, BWH
2020	Endothelial fibrosis in early-stage pulmonary arterial hypertension / invited presentation Work-in-Progress Conference, Pulmonary and Critical Care Medicine, BWH
2020	Pulmonary hypertension management / panel discussant Department of Medicine, W. Roxbury VA Medical Center, Boston, MA

2020	Pulmonary function testing: Indications and interpretation / Allergy Grand Rounds Teleconference, Pulmonary Division, MGH (virtual)
2020-2024	Pulmonary hypertension for the bedside nurse / invited talk (x 7) Shapiro Cardiovascular Center, BWH (virtual)
2020	Cardiovascular Life Sciences Research Series / invited presentation BWH (virtual)
2022	Bad tracheostomies / panelist – Laryngology Grand Rounds Mass Eye and Ear Institute, Boston, MA
2022, 2024	Pulmonary function testing / Allergy Grand Rounds MGH, Boston, MA
2022	Connective tissue disease associated pulmonary hypertension / Rheumatology Grand Rounds Department of Medicine, BWH (virtual)
2022	Proline and glucose metabolic reprogramming support vascular endothelial and medial biomass in pulmonary arterial hypertension / Invited talk MGB Department of Medicine Research Seminar Series MGH and BWH (virtual)
2023	Proline and glucose metabolic reprogramming support vascular endothelial and medial biomass in pulmonary arterial hypertension / Invited talk Cardiovascular Life Sciences Research Series, BWH
2023	Pulmonary endothelial inflammation dysregulates src family kinase signaling to increase collagen 22 prior to the development of severe pulmonary hypertension / Invited talk Work-in-Progress Research Seminar Series, Division of Pulmonary and Critical Care Medicine, BWH
2024	Management of Right Heart Failure / Invited talk 11C ICU Lecture Series, BWH
2024	Pulmonary hypertension and RV failure / Invited talk Vascular Medicine Conference series, Division of Cardiovascular Medicine, BWH
2024	Cardiovascular Work-in-Progress Conference / Invited moderator MGH, BWH, Broad Institute, Boston MA
2024	Inflammation disrupts Csk activity to promote Src activation and fibrosis in early-stage pulmonary arterial hypertension / Invited talk Work-in-Progress Research Seminar Series, Division of Pulmonary and Critical Care Medicine, BWH

Report of Regional, National and International Invited Teaching and Presentations
Invited Presentations and Courses

No presentations below were sponsored by outside entities

Regional

2015	A 51-year-old woman with cough / invited talk Intracity Pulmonary Conference, Boston University, Boston, MA
2024	A Practical Approach to Pulmonary Hypertension Medicine Grand Rounds, Veterans Affairs Boston Healthcare System, Boston, MA

National

2019	The Role of Invasive Exercise Testing for Diagnosis and Treatment of Right Heart Failure / Invited lecture Case-Based Clinical Management of Patients with Right Heart Failure, American Heart Association Scientific Sessions, Philadelphia, PA
2019	Update in CTEPH: From Bench to Bedside / Invited moderator American Heart Association Scientific Session, Philadelphia, PA

2020	Current and Emerging Strategies to Manage RV Shock in the Setting of RV Infarct / Invited lecture Critical Clinical Conundrums in Acute Coronary Syndromes / Invited lecture American College of Cardiology Annual Scientific Sessions, Chicago, IL <i>This presentation was scheduled, but then cancelled because of a Covid-19 travel/meeting ban</i>
2020	Pulmonary Hypertension Clinical Trials with Novel Approaches / Invited Social Media Moderator American Heart Association Scientific Sessions, Dallas, TX <i>This presentation was scheduled, but then cancelled because of a Covid-19 travel/meeting ban</i>
2021	Submassive pulmonary embolism / Invited moderator North American Thrombosis Forum 5 th Right Heart Symposium, Boston, MA
2022	Where We Are Today: Beyond the Original Description of Pulmonary Arterial Hypertension / Invited lecture American College of Cardiology Annual Scientific Session, Washington, DC
2022	Controversies in RV dysfunction and management: A pro-con debate / Invited moderator American Heart Association Scientific Session, Chicago, IL
2022	Vascular fibrosis in early-stage pulmonary arterial hypertension / invited lecture Pulmonary and Critical Care Medicine Lung Research Conference, Johns Hopkins Hospital, Baltimore, MD
2023	RV: the “other” ventricle / Invited moderator Technology and Heart Failure Therapeutics 2023 Meeting, Boston MA
2023	Don't Forget about the Blood Vessels! Pulmonary Vascular Function in Acute Lung Injury / Invited Moderator, American Thoracic Society 2023 Meeting, Washington DC
2023	Clinical Pearls and Emerging Insights into CTEPH Biology and Treatment / Invited Moderator, American Heart Association Scientific Sessions

International

2022	Clinical Tutorials in Pulmonary Arterial Hypertension / Invited moderator Management of pericardial effusion in PAH: Don't tap, fact or fiction / Invited Moderator 15 th Annual World Congress on Pulmonary Vascular Disease, Pulmonary Vascular Research Institute, Athens, Greece Pulmonary Vascular Research Institute World Congress, Athens, Greece
2022	An update on clinical trials in PAH / Invited moderator Pulmonary Vascular Research Institute World Congress, Athens, Greece
2023	Vasopressor Support in Right Heart Failure: Can We Optimize RV Mechanics and Coronary Perfusion? 6 th Biannual Right Heart Symposium, North American Thrombosis Forum, Boston, MA
2024	The Next 50 Years of Pulmonary Hypertension: A Global View/ Invited Moderator, Pulmonary Vascular Research Institute World Congress
2024	Are Mitochondria the Instigator of Pulmonary Arterial Hypertension? Invited Moderator, Pulmonary Vascular Research Institute Digital Webinar
2024	Critical Care Management of the Patient With Advanced Pulmonary Hypertension and Shock Who Develops Right Ventricular Ischemia Invited speaker, Right Heart Mini Symposium, North American Thrombosis Forum, Boston, MA

Report of Clinical Activities and Innovations

Current Licensure and Certification

2014	Massachusetts Medical License
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2014 American Board of Internal Medicine (ABIM)
2016 ABIM – Pulmonary Disease
2017 ABIM – Critical Care Medicine

Practice Activities

2017-2018	Ambulatory	General Pulmonary Clinic, BWH	½ session every other week
2017-	Inpatient	Intensivist / Newton Wellesley Hospital	1-2 per diem shifts/month
2018-	Ambulatory	Pulmonary Vascular Disease Clinic, BWH	½ session every other week
2018-2019	Inpatient	Pulmonary Vascular Disease Service, BWH	2 weeks/yr
2019-	Inpatient	Pulmonary Vascular Disease Service, BWH	6 weeks/yr
2020	Inpatient	COVID-19 Special Pathogen ICU and MICU Overflow Attending BWH	2 weeks/year and as needed during COVID pandemic
2020	Virtual Care	Indian Health Services Critical Care Consult Pager Coverage	2 weeks/year and as needed during COVID pandemic
2020-	Inpatient	Bedside Procedure Service, BWH	2 weeks/yr 2023- PRN coverage

Clinical Innovations

Rheumatic Pulmonary Vascular Disease Clinic (RPVD) Clinic (2019-)

Connective tissue disease associated pulmonary hypertension (PH) is associated with increased morbidity and mortality compared to other forms of pulmonary hypertension—especially for patients with systemic sclerosis (scleroderma). Reasons for this include delayed diagnosis and frequent co-occurrence of PH with conditions such as interstitial lung disease, left-sided heart disease, and pulmonary venous remodeling. A collaboration with Dr. Paul Dellaripa of the BWH Division of Rheumatology, Inflammation, and Immunity, the goal of the RPVD is to improve clinical PH outcomes in this vulnerable population through systematic screening, timely consultation, multidisciplinary risk-assessment, early treatment, and a platform for translational research.

Technological and Other Scientific Innovations

Provisional US patent coversheet application no. 63/541,939, "Methods and Materials in Pulmonary Arterial Hypertension." (2023)

Co-inventor on a novel adenovirus-based therapeutic strategy to inhibit vascular fibrosis and endothelial cell dysfunction. Provisional US patent application filed by Mass General Brigham 10/2/2023.

Report of Education of Patients and Service to the Community

Educational Material for Patients and the Lay Community

No educational materials below were sponsored by outside entities

Books, monographs, articles and presentations in other media

2011 The Doctor Can't See You Now Author Los Angeles Times, January 24, 2011

			https://www.latimes.com/archives/la-xpm-2011-jan-24-la-oe-wertheim-mdshortage-20110124-story.html
2013	How Not to Die of Botulism	Author	<i>The Atlantic</i> , December 2, 2013 http://www.theatlantic.com/health/archive/2013/12/how-not-to-die-of-botulism/281649/
2013	The Iron in Our Blood That Keeps and Kills Us	Author	<i>The Atlantic</i> , January 10, 2013 http://www.theatlantic.com/health/archive/2013/01/the-iron-in-our-blood-that-keeps-and-kills-us/266936/
2020	How a Polio Outbreak in Copenhagen Led to the Invention of the Ventilator	Author	<i>Smithsonian Magazine</i> , June 10, 2020 https://www.smithsonianmag.com/innovation/how-polio-outbreak-copenhagen-led-to-invention-ventilator-180975045/

Recognition

2020	Interviewee / Bio Quest, History of Pandemics: Part 1	Doordarshan News (India's largest public broadcaster) https://www.youtube.com/watch?v=C-82e3CA9rU
2021	Interviewee / Virus (forthcoming documentary)	Amos Pictures, HBO/BBC-affiliated project
2021	Interviewee/When Tuberculosis Patients Quarantined Inside Kentucky's Mammoth Cave	<i>Smithsonian Magazine</i> https://www.smithsonianmag.com/travel/when-tuberculosis-patients-quarantined-inside-kentuckys-mammoth-cave-180978144/
2023-	Selected for Top Doctors List, Pulmonology	Castle Connolly
2024	Selected for Top Doctors List, Pulmonology	Boston Magazine

Report of Scholarship

<http://orcid.org/0000-0002-1414-4692>

Peer reviewed publications in print or other media

Research Investigations

1. Sokolowsky K, Newton M, Lucero C, **Wertheim B**, Freedman J, Cortazar F, Czochor J, Schelvis JP, Gindt YM. Spectroscopic and thermodynamic comparisons of escherichia coli DNA photolyase and vibrio cholera cryptochrome 1. *J Phys Chem B*. 2010;114(20):7121-30. PMID: 20438097.
2. Banagan BL, **Wertheim BM**, Roth MJ, Caslake LF. Microbial strengthening of loose sand. *Lett Appl Microbiol*. 2010;51(2):138-42. PMID: 20557452.
3. Rudolf JW, Dighe AS, Coley CM, Kamis IK, **Wertheim BM**, Wright DE, Lewandrowski KB, Baron JM. Analysis of daily laboratory orders at a large urban academic center: A multifaceted approach to changing test ordering patterns. *Am J Clin Pathol*. 2017;148(2):128-35. PMID: 28898984; PMCID: PMC6322419.
4. Opotowsky AR, Hess E, Maron BA, Brittain EL, Barón AE, Maddox TM, Alshawabkeh LI, **Wertheim BM**, Xu M, Assad TR, Rich JD, Choudhary G, Tedford RJ. Thermodilution vs estimated Fick cardiac output measurement in clinical practice: An analysis of mortality from the Veterans Affairs Clinical Assessment, Reporting, and Tracking (VA CART) program and Vanderbilt University. *JAMA Cardiol*. 2017;2(10):1090-9. PMID: 28877293; PMCID: PMC5710449.
5. **Wertheim BM**, Aguirre AJ, Bhattacharyya RP, Chorba J, Jadhav AP, Kerry VB, Macklin EA, Motyckova G, Raju S, Lewandrowski K, Hunt DP, Wright DE. An educational and administrative

intervention to promote rational laboratory test ordering on an academic general medicine service. Am J Med. 2017;130(1):47-53. PMID: 27619354; PMCID: PMC6598201.

6. Oldham WM, Oliveira RKF, Wang RS, Opotowsky AR, Rubins DM, Hainer J, **Wertheim BM**, Alba GA, Choudhary G, Tornyos A, MacRae CA, Loscalzo J, Leopold JA, Waxman AB, Olschewski H, Kovacs G, Systrom DM, Maron BA. Network analysis to risk stratify patients with exercise intolerance. Circ Res. 2018;122(6):864-76. PMID: 29437835; PMCID: PMC5924425.
7. Samokhin AO, Stephens T, **Wertheim BM**, Wang RS, Vargas SO, Yung LM, Cao M, Brown M, Arons E, Dieffenbach PB, Fewell JG, Matar M, Bowman FP, Haley KJ, Alba GA, Marino SM, Kumar R, Rosas IO, Waxman AB, Oldham WM, Khanna D, Graham BB, Seo S, Gladyshev VN, Yu PB, Fredenburgh LE, Loscalzo J, Leopold JA, Maron BA. NEDD9 targets COL3A1 to promote endothelial fibrosis and pulmonary arterial hypertension. Sci Transl Med. 2018;10(445): eaap7294. PMID: 29899023; PMCID: PMC6223025.
8. **Wertheim BM**, Lin YD, Zhang YY, Samokhin AO, Alba GA, Arons E, Yu PB, Maron BA. Isolating pulmonary microvascular endothelial cells ex vivo: Implications for pulmonary arterial hypertension, and a caution on the use of commercial biomaterials. PLoS One. 2019;14(2):e0211909. PMID: 30811450; PMCID: PMC6392245
9. Samokhin AO, Hsu S, Yu PB, Waxman AB, Alba GA, **Wertheim BM**, Hopkins CD, Bowman F, Channick RN, Nikolic I, Faria-Urbina M, Hassoun PM, Leopold JA, Tedford RJ, Ventetuolo CE, Leary PJ, Maron BA. Circulating NEDD9 is increased in pulmonary arterial hypertension: A multicenter, retrospective analysis. J Heart Lung Transplant. 2020;39(4):289-99. PMID: 31952977; PMCID: PMC7605895.
10. Schimmel K, Jung M, Foinquinos A, San José G, Beaumont J, Bock K, Grote-Levi L, Xiao K, Bär C, Pfanne A, Just A, Zimmer K, Ngoy S, López B, Ravassa S, Samolovac S, Janssen-Peters H, Remke J, Scherf K, Dangwal S, Piccoli MT, Kleemiss F, Kreutzer FP, Kenneweg F, Leonardy J, Hobuß L, Santer L, Do QT, Geffers R, Braeser JH, Schmitz J, Brandenberger C, Müller DN, Wilck N, Kaever V, Bähre H, Batkai S, Fiedler J, Alexander KM, **Wertheim BM**, Fisch S, Liao R, Diez J, González A, Thum T. Natural compound library screening identifies new molecules for the treatment of cardiac fibrosis and diastolic dysfunction. Circulation. 2020;141(9):751-67. PMID: 31948273; PMCID: PMC7050799.
11. Maron BA, Brittan EL, Hess E, Waldo SW, Barón AE, Huang S, Goldstein RH, Assad T, **Wertheim BM**, Alba GA, Leopold JA, Olschewski H, Galiè N, Simonneau G, Kovacs G, Tedford RJ, Humbert M, Choudhary G. Pulmonary vascular resistance and clinical outcomes in patients with pulmonary hypertension: a retrospective cohort study. Lancet Respir Med. 2020;8(9):873-84. PMID: 32730752; PMCID: PMC8219057.
12. Alba GA, Samokhin AO, Wang RS, Zhang YY, **Wertheim BM**, Arons E, Greenfield EA, Lundberg Slingsby MH, Ceglowski JR, Haley KJ, Bowman FP, Yu YR, Haney JC, Eng G, Mitchell RN, Sheets A, Vargas SO, Seo S, Channick RN, Leary PJ, Rajagopal S, Loscalzo J, Battinelli EM, Maron BA. NEDD9 is a novel and modifiable mediator of platelet-endothelial adhesion in the pulmonary circulation. Am J Respir Crit Care Med. 2021;203(12):1533-45. PMID: 33523764; PMCID: PMC8483217.
13. Alba GA, Samokhin AO, Wang RS, **Wertheim BM**, Haley KJ, Padera RF, Vargas SO, Rosas IO, Hariri LP, Shih A, Thompson BT, Mitchell RN, Maron BA. Pulmonary endothelial NEDD9 and the prothrombotic pathophenotype of acute respiratory distress syndrome due to SARS-CoV-2 infection. Pulm Circ 2022 May 11;12(2):e12071. doi: 10.1002/pul2.12071. eCollection 2022
14. Apr. Maron BA, Kleiner DE, Arons E, **Wertheim BM**, Sharma NS, Haley KJ, Samokhin AO, Rowin EJ, Maron MS, Rosing DR, Maron BJ. Evidence of Advanced Pulmonary Vascular Remodeling in Obstructive Hypertrophic Cardiomyopathy with Pulmonary Hypertension. Chest 2022 Oct 12:S0012-3692(22)03912-5. doi: 10.1016/j.chest.2022.09.040. Online ahead of print. PMID: 36243062

15. **Wertheim BM**, Wang RS, Guillermier C, Hütter CVR, Oldham WM, Menche J, Steinhauser ML^{*†}, Maron BA*. Proline and glucose metabolic reprogramming supports vascular endothelial and medial biomass in pulmonary arterial hypertension. *JCI Insight* 2023 Feb 22;8(4):e163932. doi: 10.1172/jci.insight.163932. . (*co-senior author; †corresponding author)
16. Khurshid S, Churchill TW, Diamant N, Di Achille P, Reeder C, Singh P, Friedman SF, Wasfy MW, Alba GAA, Maron BA, Systrom DM, **Wertheim BM**, Ellinor PT, Ho JE, Baggish AL, Batra P, Lubitz SA, Guseh JS. Deep learned representations of the resting 12-lead electrocardiogram to predict VO₂ at peak exercise. *European Journal of Preventative Cardiology*, 2024 Jan 25;31(2):252-262. doi: 10.1093/eurjpc/zwad321. PMID: 37798122; PMCID: PMC10809171.
17. Miller MS, Johnson SW, Opotowsky AR, Landzberg MJ, Sharma NS, Goldberg HJ, Wong AK, Witkin AS, Rodriguez-Lopez J, Goldstein RH, Maron BA, **Wertheim BM**. Iatrogenic esophageal dysmotility as a barrier to transplantation in pulmonary arterial hypertension. *Journal of Heart and Lung Transplant Open*, April 19, 2024. doi: <https://doi.org/10.1016/j.jhlto.2024.100098>. *Online ahead of print*.
18. Xiao W, Shrimali N, Oldham WM, Clish CB, He H, Wong SJ, **Wertheim BM**, Arons E, Haigis MC, Leopold JA, Loscalzo J. Branched chain α-ketoacids aerobically activate HIF1α signaling in vascular cells. *bioRxiv [Preprint]*. 2024 May 30:2024.05.29.595538. doi: 10.1101/2024.05.29.595538. Update in: *Nat Metab*. 2024 Nov;6(11):2138-2156. doi: 10.1038/s42255-024-01150-4. PMID: 38853866; PMCID: PMC11160772.
19. Guarino VA, **Wertheim BM**, Xiao W, Loscalzo J, Zhang YY. Nanoparticle delivery of VEGF and SDF-1α as an approach for treatment of pulmonary arterial hypertension. *Pulm Circ*. 2024 Oct 8;14(4):e12412. doi: 10.1002/pul2.12412. PMID: 39380978; PMCID: PMC11459680.

Other peer-reviewed publications

1. **Wertheim BM**, Kapur S, Lakdawala NK, Carroll TL. Hypertrophic cardiomyopathy as an unexpected mimic of inducible laryngeal obstruction: The case for cardiopulmonary exercise testing in otolaryngology. *J Voice*. 2020 Dec 30:S0892-1997(20)30432-X. doi: 10.1016/j.jvoice.2020.12.002. Epub ahead of print. PMID: 33388230; PMCID: PMC8243399.

Non-peer reviewed scientific or medical publications/materials in print or other media

Reviews, chapters, monographs and editorials

1. **Wertheim BM**. COPD. In: Chon, CR, Kiefer M, editors, *Pocket Primary Care*. Philadelphia, PA: Lippincott Williams & Wilkins--Wolters Kluwer Health; 2013. Chapter 12, p. 4.
2. **Wertheim BM**, Maron BA, Oldham WM. Pulmonary Hypertension. In: Singh AK, Loscalzo J, editors. *Brigham Intensive Review of Internal Medicine*. 3rd ed. Cambridge, MA: Elsevier; 2019. pp. 906-16.
3. **Wertheim BM**, Cockrill BA. Evaluation for the dyspneic patient in primary care. In: Singh AK, Loscalzo J, editors. *Brigham Intensive Review of Internal Medicine*. 3rd ed. Cambridge, MA: Elsevier; 2019. pp. 339-47.
4. **Wertheim BM**, Maron BA. Diagnostic assessment of the pulmonary hypertension patient. *Adv Pulm Hypertension*. 2018;16(3):112-19.
5. Maron BA, **Wertheim BM**, Gladwin MT. Under pressure to clarify pulmonary hypertension clinical risk. *Am J Respir Crit Care Med*. 2018;197(4):423-6. PMID: 29216444; PMCID: PMC5821912.
6. Opotowsky AR, **Wertheim BM**, Tedford RJ. Not quite chronic thromboembolic pulmonary hypertension, but more than a SOB story. *JACC Cardiovasc Imaging*. 2019;12(8 Pt 1):1457-9. PMID: 30219406.

7. Maron BA, **Wertheim BM**. Lessons from Oz: Toward early diagnosis of pulmonary hypertension. *J Am Coll Cardiol.* 2019;73(21):2673-5.
8. Charles EJ, **Wertheim BM**. Commentary: Small packages, big questions: Mitochondrial transplantation in a preclinical model of pulmonary arterial hypertension. *J Thorac Cardiovasc Surg.* 2020 Sep 19. doi: 10.1016/j.jtcvs.2020.09.061. [Epub ahead of print] PMID: 33229181.
9. **Wertheim BM**, Maron BA, Oldham WM. Pulmonary Hypertension. In: Singh AK, Loscalzo J, editors. *Brigham Intensive Review of Internal Medicine*. 4th ed. Cambridge, MA: Elsevier. In press.
10. **Wertheim BM**, Cockrill BA. Evaluation for the dyspneic patient in primary care. In: Singh AK, Loscalzo J, editors. *Brigham Intensive Review of Internal Medicine*. 4th ed. Cambridge, MA: Elsevier. In press.
11. **Wertheim BM**. New tricks for an old drug: Prostacyclins and right ventricular contractility in pulmonary arterial hypertension. *Am J Respir Crit Care Med.* 2022 Jul 1;206(1):12-13. doi: 10.1164/rccm.202204-0648ED. PMID: 35536731.
12. **Wertheim BM**, Loscalzo J. Chapter 61, Systems Pharmacology. In: Golan D, Loscalzo J, editors. *Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy*. 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins. In press.

Professional educational materials or reports in print or other media

1. **Wertheim BM**. Family medicine. ACP Hospitalist. 2010: <http://www.acphospitalist.org/archives/2010/11/student.htm>
2. **Wertheim BM**. New England Journal of Medicine Resident 360, Pulmonology Curriculum Feb 2016 https://resident360.nejm.org/pages/home?resource_collection_id=pulmonology&subtopic=introduction

Local/Unpublished Clinical Guidelines and Reports

1. **Wertheim BM**, Gay EB, Dellaripa P. Brigham and Women's Hospital Pulmonary Hypertension Screening Guidelines for systemic sclerosis. Version January 2020.
2. Feldman W, Weinberger J, Massaro A, Cohen CL, **Wertheim BM**. Section editors: Keller S, Choi B. Brigham and Women's Hospital Guideline on COVID-19 Respiratory Support and use of Inhaled Pulmonary Vasodilators. Version April 2020. <https://covidprotocols.org>.

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings

Wertheim BM, Wang, R, Zhang Y, Samokhin AO, Alba GA, Arons E, Oldham WM, Maron BA. C-terminal src kinases inhibits endothelial fibrosis and is upregulated in early-stage experimental pulmonary arterial hypertension. Alan Lerner Research Symposium, Brigham and Women's Hospital; 2021 August 12; Boston, Massachusetts, United States (virtual).

Wertheim BM, Wang, R, Zhang Y, Samokhin AO, Alba GA, Arons E, Oldham WM, Maron BA. C-terminal src kinases inhibits endothelial fibrosis and is upregulated in early-stage experimental pulmonary arterial hypertension. Endothelial Function and Pulmonary Vascular Remodeling. American Heart Association Scientific Sessions; 2021 November 13; Boston, Massachusetts, United States (virtual).

Wertheim BM, Wang, R, Zhang Y, Samokhin AO, Alba GA, Arons E, Oldham WM, Maron BA. C-terminal src kinases inhibits endothelial fibrosis and is upregulated in early-stage experimental pulmonary arterial hypertension. Alan Lerner Research Symposium, Brigham and Women's Hospital; 2021 August 12; Boston, Massachusetts, United States (virtual).

Wertheim BM, Wang, R, Zhang Y, Samokhin AO, Alba GA, Arons E, Oldham WM, Maron BA. C-terminal src kinases inhibits endothelial fibrosis and is upregulated in early-stage experimental pulmonary arterial hypertension. Endothelial Function and Pulmonary Vascular Remodeling.

American Heart Association Scientific Sessions; 2021 November 13; Boston, Massachusetts, United States (virtual).

Samokhin AO, **Wertheim BM**, Alba GA, Arons E, Maron BA. Inhibition of Sulfatase-1 Prevents Pulmonary Arterial Hypertension in Animal Models of Disease. American Heart Association Scientific Sessions; 2023 November 23; Philadelphia, Pennsylvania, United states.

Wertheim BM, Wang R, Arons E, Sharma N, Haley K, Alba GAA, Samokhin AO, Padera R, Loscalzo J, Maron BA. Pulmonary Endothelial Inflammation Dysregulates Src Family Kinase Signaling to Increase Collagen 22 Prior to the Development of Severe Pulmonary Hypertension. Pulmonary Vascular Research Institute World Congress; 2024 February 2; London, United Kingdom.

Alba G, **Wertheim BM**, Vargas SO, Kennedy, JC, Arons E, Rahaghi N, Estépar R, Garcia-de-Alba C, Carmichael, N, Hariri L, Rodriguez-Lopez J, Channick RN, Maron BA, Raby BA. Familial KDR mutation resulting in heritable progressive pulmonary arterial hypertension. Pulmonary Vascular Research Institute World Congress; 2025 January (forthcoming); Rio de Janeiro, Brazil.

EXHIBIT 16

EXHIBIT 16

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS CORPORATION,)
Plaintiff,) C.A. No. 23-975 (RGA)
v.) [REDACTED]
LIQUIDIA TECHNOLOGIES, INC.,)
Defendant.)

CURRICULUM VITAE OF DEFENDANT'S EXPERT WITNESSES

Richard N. Channick, M.D.

Richard N. Channick, M.D.
Curriculum Vitae
Last updated in December 2024

Personal History:

Saul Brandman Chair in Pulmonary Arterial Hypertension
Professor of Clinical Medicine
David Geffen School of Medicine at UCLA
Division of Pulmonary and Critical Care Medicine
10833 Le Conte Ave, Room 43-229 CHS
Los Angeles, CA 90095-1690
Phone: 310-825-8061
Fax: 310-206-4930
rchannick@mednet.ucla.edu

Education

1976-1980	BS	Zoology	Connecticut College
1984-1987	M.D.		Temple University School of Medicine

Postdoctoral Training

1984-1987	Intern & Resident	Internal Medicine	University of Massachusetts Medical Center
1987-1988	Chief Resident	Internal Medicine	University of Massachusetts Medical Center
1988-1991	Clinical and Research Fellow	Pulmonary and Critical Care	University of California at San Diego Medical Center

Faculty Academic Appointments

2018-present	Professor of Clinical Medicine	Pulmonary and Critical Care Division	David Geffen School of Medicine at UCLA
2010-2018	Associate Professor of Medicine	Pulmonary and Critical Care Division	Harvard Medical School
2006-2009	Professor of Clinical Medicine	Pulmonary and Critical Care Division	UCSD School of Medicine
1998-2006	HS Associate Clinical Professor of Medicine	Pulmonary and Critical Care Division	UCSD School of Medicine

1992-1998	HS Assistant Clinical Professor of Medicine	Pulmonary and Critical Care Division	UCSD School of Medicine
1988-1992	Clinical Instructor of Medicine	Pulmonary and Critical Care Division	UCSD School of Medicine
1987-1988	Clinical Instructor of Medicine	Department of Medicine	University of Massachusetts Medical Center
1987-1988	Clinical Instructor of Medicine	Department of Medicine	Worcester City Hospital

Appointments at Hospitals/Affiliated Institutions

1991-2009	Staff Physician	Division of Pulmonary and Critical Care Medicine	University of California at San Diego Medical Center
2009-2013	Associate Physician	Pulmonary and Critical Care Unit, Department of Medicine	Massachusetts General Hospital
2013-2018	Physician	Division of Pulmonary and Critical Care Medicine	Massachusetts General Hospital
2018-present	Attending Physician	Pulmonary and Critical Care	UCLA Medical Center

Major Administrative Leadership Positions

Local

2009-2018	Director	Pulmonary Hypertension and Thromboendarterectomy Program Massachusetts General Hospital
2018-present	Director	Acute and Chronic Thromboembolic Disease Program UCLA Medical Center
2019-present	Co-Director	Pulmonary Vascular Disease Program UCLA Medical Center
2020-present	Saul Brandman Endowed Chair in Pulmonary Arterial Hypertension	David Geffen School of Medicine at UCLA

Committee Service

Local

2003-2006	Admissions Committee	University of California at San Diego Medical Center Member
2006-2009	Standing and Promotions Committee	University of California at San Diego Medical Center Member
2021- present	Institutional Review Board	UCLA Medical School Member
2023-present	UCLA Department of Medicine Peer Review Committee	UCLA Medical Center Member

National

2006-2014	Member, Pulmonary Vascular Disease Network Steering Committee	American College of Chest Physicians
2006-2016	Member Board of Trustees	Pulmonary Hypertension Association
2011-2017	Member, Board of Directors	Pulmonary Hypertension Care Centers, Inc.
2012-2014	Chair Scientific Leadership Council	Pulmonary Hypertension Association
2012-2016	Pulmonary Circulation Program Committee Member	American Thoracic Society
2019-2020	President	National PERT Consortium, Inc.
2018-2019	Chair, Board of Directors	Pulmonary Hypertension Care Centers, Inc.
Steering Committee Member for numerous pivotal clinical trials		

Professional Societies

1984-present	Alpha Omega Alpha Medical Honor Society	Member
1989-present	American Thoracic Society	Member
1992-present	American College of Chest Physicians	Member
1992-present	Pulmonary Hypertension Association	Member
2012	Pulmonary Embolism Response Team (PERT) Consortium	Co-founder
2019-2020	PERT Consortium	President

Editorial Activities

1. Editor in Chief

Advances in Pulmonary Hypertension 2009-2011

2. Invited Reviewer

Intensive Care Medicine

Journal of Clinical Pulmonary Medicine

Journal of Applied Physiology

Critical Care Medicine

Chest

Circulation

American Journal of Respiratory and Critical Care Medicine

European Respiratory Journal

Circulation

Journal of the American College of Cardiology

Pulmonary Circulation

Current Funded and Unfunded Projects

2011-present: Retrospective Analysis of Clinical Outcomes with Lung Transplantation

IRB# 11-003042

Sponsor: None

Role: Co-Investigator

2012-present: A Registry and Biorepository for Patients with Confirmed or Suspected Pulmonary Hypertension Due to Any Number of Causes Including But Not Limited to Connective Tissue Disease, Liver Disease, Pulmonary Fibrosis, Chronic Obstructive Pulmonary Disease, Unknown Causes, and Others

IRB# 12-000738

Sponsor: None

Role: Co-Investigator

2012-present: Outcomes of Liver Transplant Patients with Co-Morbidities

IRB# 12-001841

Sponsor: None

Role: Co-Investigator

2019-present: Pilot study to evaluate the role of endobronchial ultrasound (EBUS) in the diagnosis of acute pulmonary embolism in critically ill patients

IRB# 19-000295

Sponsor: None

Role: Co-Investigator

2019-present: Pulmonary Embolism Response Team (PERT) Consortium Registry

IRB# 19-000407

Sponsor: None

Role: PI

2020-present: Novel approaches to the ultrasonographic assessment of hemodynamics

IRB# 20-000690

Sponsor: None

Role: Co-Investigator

2020-present: Use of non-invasive measurement of cardiac output and stroke volume to assess risk and response to treatment in patients with PAH or CTEPH

IRB# 20-001981

Sponsor: Bayer AG

Role: Co-Investigator and Faculty Sponsor

2020-present: Use of non-invasive measurement of cardiac output and stroke volume to assess risk and response to treatment in patients with pulmonary embolism (PE)

IRB# 20-002033

Sponsor: None

Role: PI

2021-present: An Early Feasibility Study Assessing Treatment of Pulmonary Arterial Hypertension Using the Aria CV Pulmonary Hypertension System (ASPIRE PH)

IRB# 21-000443

Sponsor: Aria CV, Inc.

Role: PI

2021-present: A retrospective real-world evidence review for the safety and efficacy of inhaled nitric oxide (iNO) in hospitalized interstitial lung disease (ILD) patients with high oxygen requirements

IRB# 21-001232

Sponsor: None

Role: Co-Investigator

2021-present: A Phase 3, Randomized, Double-Blind, Placebo- Controlled Study to Evaluate Sotatercept When Added to Maximum Tolerated Background Therapy in Participants With Pulmonary Arterial Hypertension (PAH) World Health Organization (WHO) Functional Class (FC) III or FC IV at High Risk of Mortality (A011-14 ZENITH)

IRB# 21-001750

Sponsor: Merck and Company, Incorporated (Merck Sharp & Dohme) - Acceleron

Role: Co-Investigator

2021-present: A Phase 3, Randomized, Double-blind, Placebo-controlled Study to Evaluate Sotatercept When Added to Background Pulmonary Arterial Hypertension (PAH) Therapy in Newly Diagnosed Intermediate- and High-risk PAH Patients (A011-13 HYPERION)

IRB# 21-001828

Sponsor: Merck and Company, Incorporated (Merck Sharp & Dohme) - Acceleron

Role: Co-Investigator

2021-present: AV-101-002/ IMPAHCT: A Phase 2b/3, Randomized, Double-Blind, Placebo- Controlled, 24-Week Dose Ranging and Confirmatory Study to Evaluate the Safety and Efficacy of AV-101 in Patients with Pulmonary Arterial Hypertension (PAH) (AV-101-002 IMPAHCT)

IRB# 21-001893

Sponsor: Aerovate Therapeutics, Inc.

Role: Co-Investigator

2022-present: A Retrospective Investigation of Fluid Resuscitation and Vasopressors in Patients with Pulmonary Arterial Hypertension and Sepsis

IRB# 22-000226

Sponsor: None

Role: PI

2022-present: A Phase 2, Open-label, Dose-escalation Study to Evaluate the Safety and Efficacy of RT234 on Exercise Parameters Assessed by Cardiopulmonary Exercise Testing (CPET) in Subjects with Pulmonary Arterial Hypertension (PAH) (RT234-PAH-CL202)

IRB# 22-000437

Sponsor: RespiRA Therapeutics, Inc.

Role: Former Co-Investigator

2022-present: Portopulmonary Hypertension Biorepository

IRB# 22-000508

Sponsor: None

Role: Co-Investigator

2022-present: An Open-Label Long-term Follow-up Study to Evaluate the Effects of Sotatercept When Added to Background Pulmonary Arterial Hypertension (PAH) Therapy for the Treatment of PAH (A011-12 SOTERIA)

IRB# 22-000911

Sponsor: Merck and Company, Incorporated (Merck Sharp & Dohme) - Acceleron

Role: Co-Investigator

2022-present: Impact of the Pulmonary Index of Microcirculatory Resistance in Pulmonary Arterial Hypertension

IRB# 22-001088

Sponsor: Bayer Healthcare Pharmaceuticals, Inc.

Role: Co-Investigator

2022-present: The Pulmonary Index of Microcirculatory Resistance: A Novel Hemodynamic Index for Invasively Assessing the Pulmonary Vasculature

IRB# 22-001643

Sponsor: Abbott Vascular, Inc.

Role: Co-Investigator

2022-present: IMPAHCT-FUL: A Long-Term Extension, Multi-Center Safety Study of AV-101 in Subjects With Pulmonary Arterial Hypertension (PAH) Who Have Completed Study AV-101-002 (AV-101-003 IMPAHCT-FUL)

IRB# 22-001843

Sponsor: Aerovate Therapeutics, Inc.

Role: Co-Investigator

2023-present: VQ Scan Overlay

IRB# 23-001470

Sponsor: None

Role: Co-Investigator

2024-present: A single center retrospective review of troponin levels in patients with pulmonary hypertension; a possible biomarker for prognosis

IRB# 24-000538

Sponsor: None

Role: PI

2024-present: Pulmonary Hypertension Association Registry (PHAR)

IRB# 24-5144

Sponsor: None

Role: Co-Investigator

Formally Supervised Trainees

1994-1995	Gordon Yung, M.D. Director, Lung Transplant Program, UCSD Supervised pulmonary fellow with special interest in pulmonary vascular disease. Trained in evaluation of these patients, including right heart catheterization
1995-1996	Kim Kerr, M.D. Vice-Chief, Pulmonary and Critical Care Division, UCSD Trained pulmonary fellow in the diagnosis and evaluation of pulmonary hypertension
1996-1997	Nick Kim, M.D., Director, Pulmonary Vascular Program, UCSD Trained in evaluation and treatment of pulmonary vascular diseases. Research mentor
2000-2001	Victor Test, M.D., Director, Pulmonary Hypertension Program, Duke University Medical Center. Advanced training in all aspects of pulmonary hypertension and thromboembolic disease. Research mentor
2002-2003	Tim Williamson, M.D., Director Pulmonary Hypertension Program, University of Kansas Medical Center Supervised advanced fellow training in pulmonary vascular disease, including performance of right heart catheterization

2003-2005 Kelly Chin, M.D., Director, Pulmonary Hypertension Program, UT Southwestern
Primary clinical and research mentor in pulmonary vascular disease

2006-2007 Sonja Bartolome, M.D., Associate Director, Pulmonary Hypertension Program, UT Southwestern.
Advanced clinical training in pulmonary hypertension, including performance of right heart catheterization

2011-2013 Barbara Leverage, M.D., Director, Pulmonary Hypertension Program, Beth Israel Deaconess Medical Center
Primary clinical and research mentor in Pulmonary Vascular Diseases, including performance and interpretation of right heart catheterization

2014-2016 Hillary DuBrock, M.D., Attending Physician, Pulmonary Vascular Program, Mayo Clinic
Primary clinical and research mentor

2015-2016 Alison Witkin, M.D., Attending Physician, Pulmonary Hypertension and Thromboendarterectomy Program, Massachusetts General Hospital
Primary clinical and research mentor in Pulmonary Vascular Diseases

2017-2018 Alexandra Wong, M.D. Attending Physician, Pulmonary Vascular Program, MGH
Primary clinical and research mentor

2018-2021 Sonia Jasuja, M.D. Attending Physician, Pulmonary Vascular Disease, UCLA
Primary clinical and research mentor

2018-2021 Alex E. Sherman, M.D. Attending Physician, Pulmonary Vascular Disease, UCLA
Primary clinical and research mentor

2019-2022 Gilad Jaffe, M.D. Attending Physician, Pulmonary and Critical Care, UCSD Medical Center
Primary clinical and research mentor

2020-2023 Jennifer Chang, M.D. Attending Physician, Pulmonary and Critical Care, Portland, OR
Primary clinical and research mentor

2020-2023 Hana Bakalli, M.D. Attending Physician, Pulmonary Vascular Disease, Alaska Native Medical Center (ANMC)
Primary clinical and research mentor

Formal Teaching of Peers (e.g., CME and other continuing education courses)

Yearly lectures:

1991-2009: Pulmonary Grand Rounds, UCSD Medical Center

1991-present: More than 500 CME lectures throughout the country on all aspects of pulmonary hypertension and thromboembolic disease

2009-present: Cardiology Fellows Conference
2009-present: Pulmonary Grand Rounds, MGH
2010-present: Rheumatology Grand Rounds, MGH

Invited Presentations and Courses

Regional

1991-present More than 500 regional lectures at community hospitals, local conferences on pulmonary vascular disease.

National

Approximately 500 national and international talks at major congresses, hospitals and medical schools.

Selected Invited Lectures from Jan 2014 until present:

1/30/14 Medicine Grand Rounds, Lankenau Hospital, Philadelphia, PA: "CTEPH"
2/26/14 Brigham and Women's Hospital: "Acute Pulmonary Embolism: Role of PERT"
5/13/14 Long Island Jewish, Stony brook Hospital, Visiting Professor: "Pulmonary Hypertension"
7/16/14 MGH-North Shore; Medicine Grand Rounds: "Acute PE: Role of PERT"
9/4/14 European Respiratory Society: "Changing PAH Therapy: Real Life Experience"
11/16/14 St. Vincent's Hospital: "Update on Pulmonary Hypertension"
11/16/14 American Heart Association Annual Meeting: "Is it PAH? Why, and is it Reversible?"
12/10/14 Harvard Pulmonary Course: "Pulmonary Hypertension Overview"
2/11/15 MGH Anesthesiology Conference: "Pulmonary Embolism Response Teams"
2/26/15 Cedars Sinai Grand Rounds: "Integrating Guidelines and Clinical Trial Evidence in Treatment Strategies for PH"
3/10/15 Tufts Medical Center, Pulmonary Grand Rounds: "Chronic Thromboembolic Disease"
3/15/15 American College of Cardiology: "Treatment of Pulmonary Hypertension"
5/6/15 Society of Catheterization and Cardiovascular Intervention Annual Meeting: "Chronic Thromboembolic Pulmonary Hypertension"
5/20/15 American Thoracic Society Annual Meeting: "Thrombolysis for Acute Pulmonary Embolism"
6/5/15 European Society of Cardiology Annual Meeting: "Subgroup Analysis of SERAPHIN Trial: Anticoagulant Use"
6/15/15 University of Miami, Visiting Professor. Medicine Grand Rounds: "Update on Pulmonary Hypertension"
9/16/15 University of Tennessee, Visiting Professor Lecture: "Diagnosis and Treatment of Pulmonary Hypertension"
10/6/15 Tufts Medical Center, Pulmonary Grand Rounds: "Update on Acute Pulmonary Embolism"
10/8/15 Washington University, St. Louis, Pulmonary Hypertension Symposium: "Pulmonary Hypertension in ESRD"
10/14/15 MGH Pulmonary Grand Rounds: "CTEPH: Current Approach to Diagnosis and Treatment"
10/27/15 American College of Chest Physicians Annual Meeting: "Venous Thromboembolism: A Case Based Review"
11/27/15 Tufts Pulmonary Hypertension Symposium: "CTEPH: Update"

2/4/16	MGH Heart Failure Group Meeting: “Current Approach to Diagnosis and Treatment of Pulmonary Hypertension”
3/24/16	MGH, Orthopedic Surgery Grand Rounds: “Multidisciplinary Approach to Acute Pulmonary Embolism”
3/28/16	MGH, Medicine Residents Lecture: “Pulmonary Hypertension”
5/9/16	American Thoracic Society Annual Meeting: “PERT: The Way of the Future in Acute PE Care”
7/14/16	National Jewish Hospital, Pulmonary Grand Rounds: “Group 1 and Beyond: Case Studies in Pulmonary Hypertension”
7/16/16	Puerto Rico Society of Cardiology: “Update on Pulmonary Hypertension”
10/26/16	American College of Chest Physicians Annual Meeting: “Antiphospholipid Antibody Syndrome”
11/3/16	North Carolina Pulmonary Hypertension Symposium: “Drug Induced Pulmonary Hypertension”
11/14/16	American Heart Association Annual Meeting: “Expanding the Playbook: Surgery and Circulatory Support for the Failing PE Patient”
12/8/16	Tufts Annual PH Conference: “Ongoing and Future Clinical Trials in Pulmonary Hypertension”
3/6/17	Tufts Rheumatology Grand Rounds: “Pulmonary Hypertension in Connective Tissue Diseases”
4/16/17	University of Michigan Medical Grand Rounds: “Acute Pulmonary Embolism: Novel Approaches to Care and Follow-Up”
5/1/17	Harvard/MGH Pulmonary Course: “Acute PE: Diagnosis and Management”
5/18/17	American Thoracic Society Annual Meeting: “Pulmonary Veno-Occlusive Disease”
9/12/17	University of Vermont, Medicine Grand Rounds: “Management of Acute Pulmonary Embolism: Novel Approaches to a Multidisciplinary Problem”
9/27/17	United Medical Center, Washington, D.C. Medical Grand Rounds: “Update on Pulmonary Hypertension”
5/9/18	Methodist Hospital, Houston TX, PE Summit: “Management of Acute Pulmonary Embolism: Novel Approaches to a Multidisciplinary Problem”
10/23/18	UCLA Medicine Housestaff Lecture: “CTEPH”
2/21/19	Trudeau Society Lecture: “Treatment of Pulmonary Arterial Hypertension: The Old and the New”
5/18/19	American Thoracic Society Annual Meeting: “Right Ventricular Failure”
5/31/19	Henry Ford Health System PERT Symposium, Keynote Speaker: “The Value of a Team Approach to PE”
7/3/19	UCLA Pulmonary Fellows Lecture: “Acute PE in 2019”
7/24/19	UCLA Medicine Grand Rounds: “Pulmonary Hypertension 2019: The Evolving Landscape”
12/3/19	Visiting Professor, UCSF Fresno. Medical Grand Rounds: “Acute and Chronic Thromboembolic Disease”
12/5/19	Tufts Annual PH Conference: “Group 4 PH: Risk Assessment and Treatment”
9/12/24	Course Director, 10 th Annual PERT Consortium International Conference

Selected Visiting Professorships:

1997 Ohio State University
1999 Duke University School of Medicine
2003 Bowman Gray School of Medicine
2004 Scott and White Hospital
2006 Massachusetts General Hospital
2010 University of Tennessee Medical School
2014 University of Miami Medical School
2016 Washington University School of Medicine
2019 UCSF Fresno

**Selected
International
Lectures**

1996 Japanese Thoracic Society
1998 Visiting Professor, University of Monterrey, Mexico
2002 Visiting Professor, Goteborg University, Goteborg, Sweden
2003, 2008, Speaker, task force member, World Symposium on Pulmonary Hypertension
2013, 2018
2016 Speaker, Taiwan Society of Cardiology

Report of Clinical Activities and Innovations

Current Licensure and Certification

1988 California Medical License
1988 American Board of Internal Medicine Certification
1991 Pulmonary Medicine Certification
1992 Critical Care Medicine Certification
1992 Fluoroscopy Supervisor Certification
2003 Critical Care Medicine Recertification
2004 Pulmonary Medicine Recertification
2009 Massachusetts Medical License
2016 Pulmonary Medicine Recertification
2016 Critical Care Medicine Recertification

Clinical Innovations

Development and testing of a device for delivery of inhaled nitric oxide to patients with pulmonary hypertension

I developed a novel method for delivering inhaled nitric oxide to patients with pulmonary hypertension. This led to the first outpatient in the world being treated chronically. This work has been highly cited and has led to renewed interest in the NO molecule as a chronic therapy

Pulmonary Hypertension Service at UCSD Medical Center

Started the first clinical service for the medical treatment of pulmonary hypertension at UC San Diego, which grew to over 1000 patients

Pulmonary Embolism Response Team (PERT), MGH

Co-founded the first multidisciplinary PERT in the world. This program has expanded to over 100 hospitals and represents a paradigm shift in the approach to patients with large pulmonary emboli

Pulmonary Thromboendarterectomy (PTE) Program, MGH

Shortly after arriving at MGH, in 2010, established the MGH PTE Program for the treatment of chronic thromboembolic pulmonary hypertension, in collaboration with Cardiac and Thoracic Surgery. Within just a few years, we became the 2nd largest such program in the country, and have patients referred from around the country and even internationally for this condition

Hemorrhagic Hereditary Telangiectasia (HHT) Center

In collaboration with Genetics, ENT, Interventional Radiology and others, I co-founded the MGH HHT Program, only the second such program in New England and now one of only 16 accredited centers in the country

Electrically Produced Inhaled Nitric Oxide

In collaboration with Dr. Warren Zapol's lab, I have helped further the development of a new nitric oxide delivery system, which generates the gas from air and electricity. We have done preliminary testing of the device and are now planning a longer term study in patients with various forms of pulmonary hypertension, for what could become an inexpensive, widely available treatment, even in resource-poor parts of the world

PUBLICATIONS/BIBLIOGRAPHY

RESEARCH PAPERS

RESEARCH PAPERS (PEER REVIEWED)

A. RESEARCH PAPERS - PEER REVIEWED

1. **Channick RN**, Curley FJ, Irwin RS. Indications for and complications of rectal tube use in critically ill patients. *Journal of Intensive Care Med* 1988; 3:321-323.
2. Grogan DR, Irwin RS, **Channick RN**, Bartter T. Complications associated with thoracentesis. *Arch Int Med* 1990; 150:873-877.
3. Jamieson SW, Auger WR, Fedullo PF, **Channick RN**, Kriett JM, Tarazi RY, Moser KM. Experience and results of 150 pulmonary thromboendarterectomy operations over a 29 month period. *J Cardiovasc Thorac Surg* 1993; 106:116-127.
4. **Channick RN**, Hoch RP, Newhart JW, Johnson FW, Smith CM. Improvement in pulmonary hypertension and hypoxemia during nitric oxide inhalation in a patient with end-stage pulmonary fibrosis. *Am J Respir Crit Care Med* 1994; 149:811-14.
5. **Channick RN**, Newhart JW, Johnson FW, Moser KM. Inhaled nitric oxide reverses hypoxic pulmonary vasoconstriction in dogs: a practical nitric oxide delivery and monitoring system. *Chest* 1994;105:1842-47.
6. Newhart J, Johnson FW, Konopka RG, **Channick RN**. Nitric oxide delivery system for volume ventilators. *Respiratory Care* 1994;37(11):1366-67.
7. Kerr KM, Auger WR, Fedullo PF, **Channick RN**, YI ES, Moser KM. Large vessel pulmonary arteritis mimicking chronic thromboembolic disease. *Am J Respir Crit Care Med* 1995;152:367-373.
8. Morris TA, Auger WR, Ysrael MZ, Olson LK, **Channick RN**, Fedullo PF, Moser KM. Parenchymal scarring is associated with restrictive spirometric defects in patients with chronic thromboembolic pulmonary hypertension. *Chest* 1996;110:399-403.
9. Bradley SP, Auger WR, Moser KM, Fedullo PF, **Channick RN**, Bloor CM. Right ventricular pathology in chronic pulmonary hypertension. *Am J Card* 1996;78:584-87.
10. Hirsch AM, Moser KM, Auger WR, **Channick RN**, Fedullo, PF. Unilateral pulmonary artery thrombotic occlusion: Is distal arteriopathy a consequence? *Am J Respir Crit Care Med* 1996;154:491-6.
11. **Channick RN**, Newhart JN, Johnson FW, Williams PJ, Auger WR, Fedullo PF, Moser KM. Pulsed delivery of inhaled nitric oxide to patients with primary pulmonary hypertension: An ambulatory delivery system and initial clinical tests. *Chest* 1996;109:1545-1549.

12. Wilson WC, Kapelanski DP, Benumof JL, Newhart JW, Johnson FW, **Channick RN**. Inhaled nitric oxide (40 ppm) during one-lung ventilation, in resistance or improve oxygenation in normal patients. *J Cardiovasc and Vasc Anesth* 1997;11:172-6.
13. Bergin CJ, Hauschmidt J, Rios G, Belezzuoli EV, Huynh T, **Channick RN**. Accuracy of MR angiography compared with radionuclide scanning in identifying the cause of pulmonary arterial hypertension. *Am J Roent* 1997;168:1549-55.
14. Yung GL, **Channick RN**, Fedullo PF, Auger WR, Kerr KM, Jamieson SW, Kapelanski DP, Moser KM. Successful pulmonary thromboendarterectomy in two patients with sickle cell disease. *Am J Respir Crit Care Med* 1998;157:1690-93.
15. **Channick RN**, Yung GL. Longterm use of inhaled nitric oxide for pulmonary hypertension. *Respir Care* 1999; 44:212-219.
16. Archibald CJ, Auger WR, Fedullo PF, **Channick RN**, Kerr KM, Jamieson SW, Kapelanski DP, Watt CN, Moser KM. Long-term outcome after pulmonary thromboendarterectomy. *Am J Respir Crit Care Med* 1999. 160:523-528.
17. Mo M, Kapelanski DP, Mitraka SN, Auger WR, Fedullo PF, **Channick RN**, Kerr K, Archibald C, Jamieson SW. Reoperative pulmonary thromboendarterectomy. *Ann Thorac Surg* 1999; 68:1770-7.
18. Rothman A, Sklansky MS, Lucas VW, Kashani IA, Shaughnessy RD, **Channick RN**, Auger WR, Fedullo PF, Smith CM, Kriett JM, Jamieson SW. Atrial Septostomy as a bridge to lung transplantation in patients with severe pulmonary hypertension. *Am J Cardiol* 1999; 682-686.
19. Bergin CJ, Hauschmidt JP, Brown MA, **Channick RN**, Fedullo PF. Identifying the cause of unilateral hypoperfusion in patients suspected to have chronic pulmonary thromboembolism: Diagnostic accuracy of helical CT and conventional angiography. *Radiology* 1999; 213:743-749.
20. Kim H, Yung GL, Marsh JJ, Konopka RG, Pedersen CA, Chiles PG, Morris TA, **Channick RN**. Pulmonary vascular remodeling distal to pulmonary artery ligation is accompanied by upregulation of endothelin receptors and nitric oxide synthase. *Exp Lung Res* 2000;26:287-301.
21. Kim H, Yung GL, Marsh JJ, Konopka RG, Pedersen CA, Chiles PG, Morris TA, **Channick RN**. Endothelin mediates pulmonary vascular remodelling in a canine model of chronic embolic pulmonary hypertension. *Eur Respir J* 2000;15:640-8.
22. Kerr KM, Auger WR, Marsh JJ, Comito RM, Fedullo RL, Smits GJ.,Kapelanski DP, Fedullo PF, **Channick RN**, Jamieson SW, Moser KM. The use of cylexin (CY-1503) in prevention of reperfusion lung injury in patients undergoing pulmonary thromboendarterectomy. *Am J Respir Crit Care Med* 2000; 162:14-20.
23. Bailey CL, **Channick RN**, Auger WR, Fedullo PF, Kerr KM, Yung GL, Rubin LJ. "High Probability" perfusion lung scans in pulmonary venoocclusive disease. *Am J Respir Crit Care Med* 2000; 162:1974-8.

24. Fedullo PF, Rubin LJ, Kerr KM, Auger WR, **Channick RN**. The natural history of acute and chronic thromboembolic disease: the search for the missing link. *Eur Respir J* 2000; 15:435-7.
25. **Channick RN**, Simonneau G, Sitbon O, Robbins IM, Frost A, Tapson VF, Badesch DB, Roux S, Rainisio M, Bodin F, Rubin LJ. Effects of the dual endothelin receptor antagonist bosentan in patients with pulmonary hypertension: A placebo-controlled study. *Lancet* 2001;358:1119-23.
26. Yung GL, Kriett JM, Jamieson SW, Johnson FW, Newhart J, Kinniger K, **Channick RN**. Outpatient inhaled nitric oxide in a patient with idiopathic pulmonary fibrosis: a bridge to lung transplantation. *J Heart Lung Transplant* 2001;20:1224-7.
27. **Channick R**, Badesch DB, Tapson VF, Simonneau G, Robbins I, Frost A, Roux S, Rainisio M, Bodin F, Rubin LJ. Effects of the dual endothelin receptor antagonist bosentan in patients with pulmonary hypertension: a placebo-controlled study. *J Heart Lung Transplant* 2001;20:262-263.
28. Jamieson SW, Kapelanski DP, Sakakibara N, Manecke GR, Thistlethwaite PA, Kerr KM, **Channick RN**, Fedullo PF, Auger WR. Pulmonary endarterectomy: experience and lessons learned in 1,500 cases. *Ann Thorac Surg* 2003; 76:1457-62.
29. Kim NH, **Channick RN**, Rubin LJ. Successful withdrawal of long-term epoprostenol therapy for pulmonary hypertension. *Chest* 2003;124:1612-5
30. Sitbon O, Badesch DB, **Channick RN**, Frost A, Robbins IM, Simonneau G, Tapson VF, Rubin LJ. Effects of the dual endothelin receptor antagonist bosentan in patients with pulmonary arterial hypertension: a 1-year follow-up study. *Chest* 2003;124:247-54.
31. Tulevski II, Bresser P, Hirsch A, Groenink M, **Channick RN**, Jamieson SW, Mulder BJ. Decreased plasma neurohormones and improved cardiac performance after surgical treatment of chronic pulmonary embolism. *Ann Thorac Surg* 2003; 76:287-90.
32. Barst RJ, McGoon M, McLaughlin V, Tapson V, Rich S, Rubin L, Wasserman K, Oudiz R, Shapiro S, Robbins IM, **Channick R**, Badesch D, Rayburn BK, Flinchbaugh R, Sigman J, Ameson C, Jeffs R; Beraprost Study Group. Beraprost therapy for pulmonary arterial hypertension. *J Am Coll Cardiol* 2003;41:2119-25.
33. Galie N, Hinderliter AL, Torbick A, Fourme T, Simonneau G, Pulido T, Espinola-Zavaleta N, Rocchi G, Manes A, Frantz R, Kurayna M, Nagueh SF, Barst R, **Channick R**, Dujardin K, Kronenberg A, Leconte I, Rainisio M, Rubin L. Effects of the oral endothelin-receptor antagonist bosentan on echocardiographic and Doppler measures in patients with pulmonary arterial hypertension. *J AM Coll Cardiol* 2003;41:1830-6.
34. Fesler P, Pagnamenta A, Vachiery JL, Brimioule S, Abdel Kafj S, Boonstra A, Delcroix M, **Channick RN**, Rubin LJ, Naeije R. Single arterial occlusion to locate resistance in patients with pulmonary hypertension. *Eur Respir J* 2003;21:31-6.

35. Kim NH, Fesler P, **Channick RN**, Knowlton KU, Ben-Yehuda O, Lee SH, Naeije R, Rubin LJ. Preoperative partitioning of pulmonary vascular resistance correlates with early outcome after thromboendarterectomy for chronic thromboembolic pulmonary hypertension. *Circulation* 2004; 109:18-22.
36. Yung GL, Fedullo PF, Kinninger K, Johnson W, **Channick RN**. Comparison of impedance cardiography to direct Fick and thermodilution cardiac output determination in pulmonary arterial hypertension. *Congest Heart Fail* 2004;10:7-10.
37. Bresser P, Fedullo PF, Auger WR, **Channick RN**, Robbins IM, Kerr KM, Jamieson SW, Rubin LJ. Continuous intravenous epoprostenol for chronic thromboembolic pulmonary hypertension. *Eur Respir J* 2004; 23:595-600.
38. **Channick RN**, Sitbon O, Barst RJ, Manes A, Rubin LJ. Endothelin receptor antagonists in pulmonary arterial hypertension. *J Am Coll Cardiol* 2004; 43:62S-67S.
39. Ghofrani HA, Pepke-Zaba J, Barbera JA, **Channick R**, Keogh AM, Gomez-Sanchez MA, Kneussl M, Grimminger F. Nitric oxide pathway and phosphodiesterase inhibitors in pulmonary arterial hypertension. *J Am Coll Cardiol* 2004; 43:68S-72S.
40. Doyle RL, McCrory D, **Channick RN**, Simonneau G, Conte J. Surgical treatments/interventions for pulmonary arterial hypertension: ACCP evidence-based clinical practice guidelines. *Chest* 2004; 126:63S-71S.
41. **Channick R**, Williamson TL. Diagnosis and treatment of pulmonary arterial hypertension. *Cardiol Clin* 2004; 22:441-452.
42. Humbert M, Barst RJ, Robbins IM, **Channick RN**, Galie N, Boonstra A, Rubin LJ, Horn EM, Manes A, Simonneau G. Combination of bosentan with epoprostenol in pulmonary arterial hypertension: BREATHE-2. *Eur Respir J*. 2004;24:353-9.
43. **Channick RN**, Olschewski H, Seeger W, Staub T, Rubin LJ. Safety and Efficacy of Inhaled Treprostinil as Add-On Therapy to Bosentan in Pulmonary Arterial Hypertension. *J Am Coll Cardiol* 2006; 48(7):1433-7.
44. Chin K, **Channick RN**, Rubin LJ. Is methamphetamine use associated with idiopathic pulmonary arterial hypertension? *Chest* 2006; 130:1657-1663.
45. Walker AM, Langleben D, Korelitz JJ, Rich S, Rubin LJ, Strom BL, Gonon R, Keast S, Badesch D, Barst RJ, Bourge RC, **Channick R**, Frost A, Gaine S, McGoon M, McLaughlin V, Murali S, Oudiz RJ, Robbins IM, Tapson V, Abenaim L, Constantine G: Temporal Trends And Drug Exposures in Pulmonary Hypertension: An American Experience. *Am Heart J*, 2006, 152(3):521-6.
46. McLaughlin VV, Oudiz RJ, Frost A, Tapson VF, Murali S, **Channick RN**, Badesch DB,Barst RJ, Hsu H, Rubin LJ: A Randomized, Double-Blind, Placebo-Controlled Study of Iloprost Inhalation as Add-On Therapy to Bosentan in Pulmonary Arterial Hypertension. *Am J Resp Crit Care Med* 2006, 174(11):1257-63.

47. Remillard CV, Tigno DD, Platoshyn O, Burg ED, Brevnova EE, Conder D, Nicholson A, Rana BK, **Channick RN**, Rubin LJ, O'Connor DT, Yuan JX. Function of Kv1.5 channels and genetic variations of KCNA5 in patients with idiopathic pulmonary arterial hypertension. *Am J Physiol Cell Physiol* 2007; 292: 1837-53.
48. McLaughlin VV, **Channick R**. Sickle cell disease-associated pulmonary hypertension: a coat of many colors. *Am J Respir Crit Care Med* 2007; 175:1218-9.
49. Chin K, **Channick R**, Kim N, Rubin L. Central venous blood oxygen saturation monitoring in patients with chronic pulmonary arterial hypertension treated with continuous intravenous epoprostenol: correlation with measurements of hemodynamics and plasma brain natriuretic peptide levels. *Chest* 2007; 132:786-92.
50. Chin K, **Channick R**, de Lemos J, Kim N, Torres F, Rubin L. Hemodynamics and epoprostenol use are associated with thrombocytopenia in pulmonary arterial hypertension. *Chest*. 2008 Aug 21
51. Hennigan S, **Channick R**, Silverman G. Rituximab treatment of pulmonary arterial hypertension associated with systemic lupus erythematosus: a case report. *Lupus*. 2008;17(8):754-6.
52. Rothman A, Galindo A, **Channick R**, Blanchard D.. Amplatzer device closure of a tortuous Gerbode (left ventricle-to-right atrium) defect complicated by transient hemolysis in an octogenarian. *J Invasive Cardiol*. 2008 Sep;20(9):E273-6
53. Yu Y, Keller SH, Remillard CV, Safrina O, Nicholson A, Zhang SL, Jiang W, Vangala N, Landsberg JW, Wang JY, Thistlethwaite PA, **Channick RN**, Robbins IM, Loyd JE, Ghofrani HA, Grimmerger F, Schermuly RT, Cahalan MD, Rubin LJ, Yuan JX. A functional single-nucleotide polymorphism in the TRPC6 gene promoter associated with idiopathic pulmonary arterial hypertension. *Circulation*. 2009 May 5;119(17):2313-22.
54. Hoeper MM, Barberà JA, **Channick RN**, Hassoun PM, Lang IM, Manes A, Martinez FJ, Naeije R, Olszewski H, Pepke-Zaba J, Redfield MM, Robbins IM, Souza R, Torbicki A, McGoon M. Diagnosis, assessment, and treatment of non-pulmonary arterial hypertension pulmonary hypertension. *J Am Coll Cardiol*. 2009 Jun 30;54(1 Suppl):S85-96.
55. Simonneau G, Robbins IM, Beghetti M, **Channick RN**, Delcroix M, Denton CP, Elliott CG, Gaine SP, Gladwin MT, Jing ZC, Krowka MJ, Langleben D, Nakanishi N, Souza R. Updated clinical classification of pulmonary hypertension. *J Am Coll Cardiol*. 2009 Jun 30;54(1 Suppl):S43-54.
56. McLaughlin VV, Benza RL, Rubin LJ, **Channick RN**, Voswinckel R, Tapson VF, Robbins IM, Olszewski H, Rubenfire M, Seeger W. Addition of inhaled treprostinil to oral therapy for pulmonary arterial hypertension: a randomized controlled clinical trial. *J Am Coll Cardiol*. 2010 May 4;55(18):1915-22

57. Benza RL, Seeger W, McLaughlin VV, **Channick RN**, Voswinckel R, Tapson VF, Robbins IM, Olszewski H, Rubin LJ. Long-term effects of inhaled treprostinil in patients with pulmonary arterial hypertension: the Treprostinil Sodium Inhalation Used in the Management of Pulmonary Arterial Hypertension (TRIUMPH) study open-label extension. *J Heart Lung Transplant*. 2011 Dec;30(12):1327-33.

58. **Channick RN**, Voswinckel R, Rubin LJ. Inhaled treprostinil: a therapeutic review. *Drug Des Devel Ther*. 2012;6:19-28.

59. Kerr KM, Auger WR, Marsh JJ, Devendra G, Spragg RG, Kim NH, **Channick RN**, Jamieson SW, Madani MM, Manecke GR, Roth DM, Shragg GP, Fedullo PF. Efficacy of methylprednisolone in preventing lung injury following pulmonary thromboendarterectomy. *Chest*. 2012 Jan;141(1):27-35.

60. Clements PJ, Tan M, McLaughlin VV, Oudiz RJ, Tapson VF, **Channick RN**, Rubin LJ, Langer A; Pulmonary Arterial Hypertension Quality Enhancement Research Initiative (PAH-QuERI) Investigators. The pulmonary arterial hypertension quality enhancement research initiative: comparison of patients with idiopathic PAH to patients with systemic sclerosis-associated PAH. *Ann Rheum Dis*. 2012 Feb;71(2):249-52.

61. Badesch DB, Feldman J, Keogh A, Mathier MA, Oudiz RJ, Shapiro S, Farber HW, McGoon M, Frost A, Allard M, Despain D, Dufton C, Rubin LJ; **ARIES-3 Study Group**. ARIES-3: ambrisentan therapy in a diverse population of patients with pulmonary hypertension. *Cardiovasc Ther*. 2012 Apr;30(2):93-9.

62. **Channick RN**, Lorenzo ME, Wu CC, Hoang MP. Case records of the Massachusetts General Hospital. Case 11-2012. A 60-year-old man with weakness, rash, and renal failure. *N Engl J Med*. 2012 Apr 12;366(15):1434-43.

63. Barst RJ, **Channick R**, Ivy D, Goldstein B. Clinical perspectives with long-term pulsed inhaled nitric oxide for the treatment of pulmonary arterial hypertension. *Pulm Circ*. 2012 Apr-Jun;2(2):139-47.

64. LeVarge BL, **Channick RN**. Inhaled treprostinil for the treatment of pulmonary arterial hypertension. *Expert Rev Respir Med*. 2012 Jun;6(3):255-65.

65. McLaughlin VV, Langer A, Tan M, Clements PJ, Oudiz RJ, Tapson VF, **Channick RN**, Rubin LJ; for the Pulmonary Arterial Hypertension (PAH) Quality Enhancement Research Initiative (QuERI) Investigators*. Contemporary Trends in the Diagnosis and Management of Pulmonary Arterial Hypertension: An Initiative to Close the Care Gap. *Chest*. 2012 Aug 1

66. Kovach AE, Cheng GZ, Channick CL, **Channick RN**, Muniappan A, Gaiserrat HA, Kradin RL. Postradiofrequency ablation inflammatory pseudotumor associated with pulmonary venoocclusive disease: case report and review of the literature. *Ann Diagn Pathol*. 2013 Jan 22.

67. Bourge RC, Tapson VF, Safdar Z, Benza RL, **Channick RN**, Rosenzweig EB, Shapiro S, White RJ, McSwain CS, Gotzkowsky SK, Nelsen AC, Rubin LJ. Rapid transition from inhaled iloprost to inhaled treprostinil in patients with pulmonary arterial hypertension. *Cardiovasc Ther.* 2013 Feb;31(1):38-44.
68. Sise ME, Courtwright AM, **Channick RN** Pulmonary hypertension in patients with chronic and end-stage kidney disease. *Kidney Int.* 2013 10:186
69. **Channick RN** . Combination therapy in pulmonary arterial hypertension. *Am J Cardiol.* 2013 Apr 16;111(8 Suppl):16C-20C.
70. **Channick RN**, Frantz RP, Kawut SM, Palevsky H, Tumuluri R, Sulica R, Lauto PO, Benton WW, de Boisblanc B. A multicenter, retrospective study of patients with pulmonary arterial hypertension transitioned from parenteral prostacyclin therapy to inhaled iloprost. *Pulm Circ.* 2013 Apr;3(2):381-8. doi: 10.4103/2045-8932.114768.
71. Malhotra R, Paskin-Flerlage S, Zamanian RT, Zimmerman P, Schmidt JW, Deng DY, Southwood M, Spencer R, Lai CS, Parker W, **Channick RN**, Morrell NW, Elliott CG, Yu PB. Circulating angiogenic modulatory factors predict survival and functional class in pulmonary arterial hypertension. *Pulm Circ.* 2013 Apr;3(2):369-80.
72. Pulido T, Adzerikho I, **Channick RN**, Delcroix M, Galiè N, Ghofrani HA, Jansa P, Jing ZC, Le Brun FO, Mehta S, Mittelholzer CM, Perchenet L, Sastry BK, Sitbon O, Souza R, Torbicki A, Zeng X, Rubin LJ, Simonneau G; SERAPHIN Investigators. Macitentan and morbidity and mortality in pulmonary arterial hypertension. *N Engl J Med.* 2013 Aug 29;369(9):809-18
73. Kabrhel C, Jaff MR, **Channick RN**, Baker JN, Rosenfield K A multidisciplinary pulmonary embolism response team. *Chest.* 2013 Nov;144(5):1738-9.
74. Kim NH, Delcroix M, Jenkins DP, **Channick R**, Darteville P, Jansa P, Lang I, Madani MM, Ogino H, Pengo V, Mayer E. Chronic thromboembolic pulmonary hypertension. *J Am Coll Cardiol.* 2013 Dec 24;62(25 Suppl):D92-9.
75. **Channick R**, Preston I, Klinger JR. Oral therapies for pulmonary arterial hypertension: endothelin receptor antagonists and phosphodiesterase-5 inhibitors. *Clin Chest Med.* 2013 Dec;34(4):811-24.
76. Khanna D, Gladue H, **Channick R**, Chung L, Distler O, Furst DE, Hachulla E, Humbert M, Langleben D, Mathai SC, Saggar R, Visovatti S, Altork N, Townsend W, FitzGerald J, McLaughlin VV; Scleroderma Foundation and Pulmonary Hypertension Association. Recommendations for screening and detection of connective tissue disease-associated pulmonary arterial hypertension. *Arthritis Rheum.* 2013 Dec;65(12):3194-201
77. Provias T, Dudzinski DM, Jaff MR, Rosenfield K, **Channick R**, Baker J, Weinberg I, Donaldson C, Narayan R, Rassi AN, Kabrhel C. The Massachusetts General Hospital Pulmonary Embolism Response Team (MGH PERT): Creation of a Multidisciplinary Program to Improve Care of Patients With Massive and Submassive Pulmonary Embolism. *Hosp Pract (1995).* 2014 Feb;42(1):31-7.

78. Saukkonen K, Tan TC, Sharma A, **Channick RN**, Murali MR, Zukerberg LR. Case records of the Massachusetts General Hospital. Case 9-2014. A 34-year-old woman with increasing dyspnea. *N Engl J Med.* 2014 Mar 20;370(12):1149-57
79. LeVarge BL, Pomerantsev E., **Channick RN**. Reliance on end-expiratory wedge pressure leads to misclassification of pulmonary hypertension. *Eur Respir J* 2014; 44:425-34
80. **Channick RN**, Delcroix M, Ghofrani HA, Hunsche E, Jansa P, Le Brun FO, Mehta S, Pulido T, Rubin LJ, Sastry BK, Simonneau G, Sitbon O, Souza R, Torbicki A, Galie N. Effect of macitentan on hospitalizations: results from the SERAPHIN trial. *JACC Heart Fail* 2015; 3:1-8.
81. Afilalo J, Grapsa J, Nihoyannopoulos P, Beaudoin J, Gibbs JS, **Channick RN**, Langleben D, Rudski LG, Hua L, Handschumacher MD, Picard MH, Levine RA. Leaflet area as a determinant of tricuspid regurgitation severity in patients with pulmonary hypertension. *Circ Cardiovasc Imaging* 2015; 8 (5)
82. Sheu EG, **Channick R**, Gee DW. Improvement in severe pulmonary hypertension in obese patients after laparoscopic gastric bypass or sleeve gastrectomy. *Surg Endosc* 2015;
83. McLaughlin V, **Channick R**, Ghofrani HG, Lemarie JC, Naeije R, Packer M, Souza R, Tapson VF, Tolson J, Al Hiti H, Meyer G, Hoeper MM. Bosentan added to sildenafil therapy in patients with pulmonary arterial hypertension. *Eur Respir J* 2015; 46:405-13.
84. Selej M, Romero AJ, **Channick RN**, Clozel M. Development of macitentan for the treatment of pulmonary arterial hypertension. *Ann NY Acad Sci* 2015
85. DuBrock HM , Kradin RL, Rodriguez-Lopez JM, **Channick RN**. Pulmonary capillary hemangiomatosis: the role of invasive cardiopulmonary exercise testing. *Pulm Circ* 2015;5:580-6
86. Parikh VN, Park J, Nikolic I, **Channick R**, Yu PB, De Marco T, Hsue PY, Chan SY. Brief report: Coordinated modulation of circulating miR-21 in HIV, HIV-associated pulmonary arterial hypertension, and HIV/Hepatitis C virus coinfection. *J Acquir Immune Defic Syndr* 2015; 70:236-41.
87. Simonneau G, **Channick R**, Delcroix M, Galie N, Ghofrani HA, Jansa P, Le Brun FO, Mehta S, Perchenet L, Pulido T, Sastry BK, Sitbon O, Souza R, Torbicki A, Rubin LJ. Incident and prevalent cohorts with pulmonary arterial hypertension: insight from SERAPHIN. *Eur Resp J* 2015; 46:1711-20.
88. Sitbon O, **Channick R**, Chin KM, Frey A, Gaine S, Galie N, Ghofrani HA, Hoeper MM, Lang IM, Preiss R, Rubin LJ, Di Scala L, Tapson V, Adzerikho I, Liu J, Moiseeva O, Zeng X, Simonneau G, McLaughlin VV; GRIPHON investigators. Selexipag for the treatment of pulmonary arterial hypertension. *N Engl J Med* 2015; 373:2522-33.
89. Pepke-Zaba J, Jais X, **Channick R**. Medical Therapy in Chronic Thromboembolic Pulmonary Hypertension. *Ann Am Thorac Soc*. 2016 Jul;13 Suppl 3:S248-54

90. Kabrhel C, Rosovsky R, **Channick R**, Jaff MR, Weinberg I, Sundt T, Dudzinski DM, Rodriguez-Lopez J, Parry BA, Harshbarger S, Chang Y, Rosenfield K A Multidisciplinary Pulmonary Embolism Response Team: Initial 30-Month Experience With a Novel Approach to Delivery of Care to Patients With Submassive and Massive Pulmonary Embolism. *Chest*. 2016 Aug;150(2):384-93
91. Tapson VF, Platt DM, Xia F, Teal SA, de la Orden M, Divers CH, Satler CA, Joish VN, **Channick RN**. Monitoring for Pulmonary Hypertension Following Pulmonary Embolism: The INFORM Study. *Am J Med*. 2016 Sep;129(9):978-985
92. Humbert M, **Channick RN**. Pulmonary hypertension. *Curr Opin Pulm Med*. 2016 Sep;22(5):399
93. Tamura Y, **Channick RN**. New paradigm for pulmonary arterial hypertension treatment. *Curr Opin Pulm Med*. 2016 Sep;22(5):429-33
94. Mehta S, Sastry BK, Souza R, Torbicki A, Ghofrani HA, **Channick RN**, Delcroix M, Pulido T, Simonneau G, Wlodarczyk J, Rubin LJ, Jansa P, Hunsche E, Galiè N, Perchenet L, Sitbon O. Macitentan improves health-related quality of life for patients with pulmonary arterial hypertension: results from the randomized controlled SERAPHIN trial. *Chest*. 2016 Sep 23. pii: S0012-3692(16)59209-5.
95. Berra L, Rodriguez-Lopez J, Rezoagli E, Yu B, Fisher DF, Semigran MJ, Bloch DB, **Channick RN**, Zapol WM. Electric Plasma-generated Nitric Oxide: Hemodynamic Effects in Patients with Pulmonary Hypertension. *Am J Respir Crit Care Med*. 2016 Nov 1;194(9):1168-1170. No abstract available
96. DuBrock HM, Rodriguez-Lopez JM, LeVarge BL, Curry MP, VanderLaan PA, Zsengeller ZK, Pernicone E, Preston IR, Yu PB, Nikolic I, Xu D, Thadhani RI, **Channick RN**, Ananth Karumanchi S. Macrophage migration inhibitory factor as a novel biomarker of portopulmonary hypertension. *Pulm Circ*. 2016 Dec;6(4):498-507.
97. Olsson KM, **Channick R**. Pregnancy in pulmonary arterial hypertension. *Eur Respir Rev*. 2016 Dec;25(142):431-437.
98. Rodriguez-Lopez J, **Channick R**. The Pulmonary embolism response team: What is the ideal model? *Semin Respir Crit Care Med*. 2017 Feb;38(1):51-55.
99. DuBrock HM, Goldberg DS, Sussman NL, Bartolome SD, Kadry Z, Salgia RJ, Mulligan DC, Kremers WK, Kawut SM, Krowka MJ, **Channick RN**. Predictors of Waitlist Mortality in Portopulmonary Hypertension. *Transplantation*. 2017 Feb 15.
100. Jain CC, Chang Y, Kabrhel C, Giri J, **Channick R**, Rodriguez-Lopez J, Rosovsky RP, Fogerty A, Rosenfield K, Jaff MR, Weinberg I. Impact of Pulmonary Arterial Clot Location on Pulmonary Embolism Treatment and Outcomes (90 Days). *Am J Cardiol*. 2017 Mar 1;119(5):802-807

101. Galiè N, Jansa P, Pulido T, **Channick RN**, Delcroix M, Ghofrani HA, Le Brun FO, Mehta S, Perchenet L, Rubin LJ, Sastry BKS, Simonneau G, Sitbon O, Souza R, Torbicki A. SERAPHIN haemodynamic substudy: the effect of the dual endothelin receptor antagonist macitentan on haemodynamic parameters and NT-proBNP levels and their association with disease progression in patients with pulmonary arterial hypertension. *Eur Heart J.* 2017 Apr 14;38(15):1147-1155.

102. Gaine S, Chin K, Coghlan G, **Channick R**, Di Scala L, Galiè N, Ghofrani HA, Lang IM, McLaughlin V, Preiss R, Rubin LJ, Simonneau G, Sitbon O, Tapson VF, Hoeper MM. Selexipag for the treatment of connective tissue disease-associated pulmonary arterial hypertension. *Eur Respir J.* 2017 Aug 17;50(2).

103. Liu D, Sindhu K, Witkin A, Patel L, **Channick R**. Pulmonary Hypertension in a Patient with Hereditary Hemorrhagic Telangiectasia. *R I Med J* (2013). 2017 Aug 1;100(8):29-31

104. McNeill JN, Witkin AS, Chang Y, Kabrhel C, **Channick RN**. Does the Time of Day a Pulmonary Embolism Response Team Is Activated Affect Time to Intervention or Outcome? *Chest.* 2017 Dec;152(6):1353-1354.

105. Sihag S, Le B, Witkin AS, Rodriguez-Lopez JM, Villavicencio MA, Vlahakes GJ, **Channick RN**, Wright CD. Quantifying the learning curve for pulmonary thromboendarterectomy. *J Cardiothorac Surg.* 2017 Dec 28;12(1):121.

106. Coghlan JG, **Channick R**, Chin K, Di Scala L, Galiè N, Ghofrani HA, Hoeper MM, Lang IM, McLaughlin V, Preiss R, Rubin LJ, Simonneau G, Sitbon O, Tapson VF, Gaine S. Targeting the Prostacyclin Pathway with Selexipag in Patients with Pulmonary Arterial Hypertension Receiving Double Combination Therapy: Insights from the Randomized Controlled GRIPHON Study. *Am J Cardiovasc Drugs.* 2018 Feb;18(1):37-47

107. McLaughlin VV, Hoeper MM, **Channick RN**, Chin KM, Delcroix M, Gaine S, Ghofrani HA, Jansa P, Lang IM, Mehta S, Pulido T, Sastry BKS, Simonneau G, Sitbon O, Souza R, Torbicki A, Tapson VF, Perchenet L, Preiss R, Verweij P, Rubin LJ, Galiè N. Pulmonary Arterial Hypertension-Related Morbidity Is Prognostic for Mortality. *J Am Coll Cardiol.* 2018 Feb 20;71(7):752-763

108. Souza R, **Channick RN**, Delcroix M, Galiè N, Ghofrani HA, Jansa P, Le Brun FO, Mehta S, Perchenet L, Pulido T, Sastry BKS, Sitbon O, Torbicki A, Rubin LJ, Simonneau G. Association between six-minute walk distance and long-term outcomes in patients with pulmonary arterial hypertension: Data from the randomized SERAPHIN trial. *PLoS One.* 2018 Mar 28;13(3)

109. Preston IR, **Channick RN**, Chin K, Di Scala L, Farber HW, Gaine S, Galiè N, Ghofrani HA, Hoeper MM, Lang IM, McLaughlin VV, Preiss R, Simonneau G, Sitbon O, Tapson VF, Rubin LJ. Temporary treatment interruptions with oral selexipag in pulmonary arterial hypertension: Insights from the Prostacyclin (PGI₂) Receptor Agonist in Pulmonary Arterial Hypertension (GRIPHON) study. *J Heart Lung Transplant.* 2018 Mar;37(3):401-408.

110. Chin KM, Gomberg-Maitland M, **Channick RN**, Cuttica MJ, Fischer A, Frantz RP, Hunsche E, Kleinman L, McConnell JW, McLaughlin VV, Miller CE, Zamanian RT, Zastrow MS, Badesch DB. Psychometric Validation of the Pulmonary Arterial Hypertension-Symptoms and Impact (PAH-SYMPACT) Questionnaire: Results of the SYMPHONY Trial. *Chest*. 2018 Apr 26; pii: S0012-3692(18)30649-4.

111. Rosovsky R, Chang Y, Rosenfield K, **Channick R**, Jaff MR, Weinberg I, Sundt T, Witkin A, Rodriguez-Lopez J, Parry BA, Harshbarger S, Hariharan P, Kabrhel C. Changes in treatment and outcomes after creation of a pulmonary embolism response team (PERT), a 10-year analysis. *J Thromb Thrombolysis*. 2018 Sep 21.

112. Nikolic I, Yung LM, Yang P, Malhotra R, Paskin-Flerlage SD, Dinter T, Bocobo GA, Tumelty KE, Faugno AJ, Troncone L, McNeil ME, Huang X, Coser KR, Lai CSC, Upton PD, Goumans MJ, Zamanian RT, Elliott CG, Lee A, Zheng W, Berasi SP, Huard C, Morrell NW, Chung RT, **Channick R**, Roberts KE, Yu PB. Bone Morphogenetic Protein 9 is a Mechanistic Biomarker of Portopulmonary Hypertension. *Am J Respir Crit Care Med*. 2018 Oct 12.

113. Dalia AA, Streckenbach S, Andrawes M, **Channick R**, Wright C, Fitzsimons M. Management of Pulmonary Hemorrhage Complicating Pulmonary Thromboendarterectomy. *Front Med (Lausanne)*. 2018 Nov 21;5:326.

114. Witkin A, Wilcox SR, Chang Y, Huang F, Dudzinski D, Zheng H, **Channick R**, Kabrhel C. Impact of chronic right ventricular pressure overload in short-term outcomes of acute pulmonary embolism: A retrospective analysis. *J Crit Care*. 2019 Jan 11;51:1-5.

115. Beghetti M, **Channick RN**, Chin KM, Di Scala L, Gaine S, Ghofrani HA, Hoeper MM, Lang IM, McLaughlin VV, Preiss R, Rubin LJ, Simonneau G, Sitbon O, Tapson VF, Galiè N. Selexipag treatment for pulmonary arterial hypertension associated with congenital heart disease after defect correction: insights from the randomised controlled GRIPHON study. *Eur J Heart Fail*. 2019 Jan 11.

116. Galiè N, **Channick RN**, Frantz RP, Grünig E, Jing ZC, Moiseeva O, Preston IR, Pulido T, Safdar Z, Tamura Y, McLaughlin V. Risk stratification and medical therapy of pulmonary arterial hypertension. *Eur Respir J*. 2019 Jan 24;53(1).

117. Rivera-Lebron B, McDaniel M, Ahrar K, Alrifai A, Dudzinski DM, Fanola C, Blais D, Janicke D, Melamed R, Mohrien K, Rozycki E, Ross CB, Klein AJ, Rali P, Teman NR, Yarboro L, Ichinose E, Sharma AM, Bartos JA, Elder M, Keeling B, Palevsky H, Naydenov S, Sen P, Amoroso N, Rodriguez-Lopez JM, Davis GA, Rosovsky R, Rosenfield K, Kabrhel C, Horowitz J, Giri JS, Tapson V, **Channick R**; PERT Consortium. Diagnosis, Treatment and Follow Up of Acute Pulmonary Embolism: Consensus Practice from the PERT Consortium. *Clin Appl Thromb Hemost*. 2019 Jan-Dec;25

118. Seki A, Anklesaria Z, Saggar R, Dodson MW, Schwab K, Liu MC, Charan Ashana D, Miller WD, Vangala S, DerHovanessian A, **Channick R**, Shaikh F, Belperio JA, Weigt SS, Lynch JP, Ross DJ, Sullivan L, Khanna D, Shapiro SS, Sager J, Gargani L, Stanziola A, Bossone E, Schraufnagel DE, Fishbein G, Xu H, Fishbein MC, Wallace WD, Saggar R. Capillary Proliferation in Systemic-Sclerosis-Related Pulmonary Fibrosis: Association with Pulmonary Hypertension. *ACR Open Rheumatol.* 2019 Mar 15;1(1):26-36

119. Channick CL, **Channick RN**. Use of Endobronchial Ultrasound for Bedside Diagnosis of Acute Pulmonary Embolism in a Critically Ill Patient. *Chest.* 2019 Mar;155(3):651-652

120. Torbicki A, Bacchi M, Delcroix M, Farber HW, Ghofrani HA, Hennessy B, Jansa P, Mehta S, Perchenet L, Pulido T, Rosenberg D, Rubin LJ, Sastry BKS, Simonneau G, Sitbon O, Souza R, Wei LJ, **Channick R**, Benza R. Integrating Data From Randomized Controlled Trials and Observational Studies to Assess Survival in Rare Diseases. *Circ Cardiovasc Qual Outcomes.* 2019 May;12(5):e005095.

121. Chandy G, **Channick R**. The Identification and Management of Unsuspected Hemodynamically Unstable Pulmonary Embolism: The Need for Structured Multidisciplinary Teams. *Can J Cardiol.* 2019 Jul;35(7):819-820. doi: 10.1016/j.cjca.2019.04.023. Epub 2019 May 7.

122. Chin KM, Rubin LJ, **Channick R**, Di Scala L, Gaine S, Galie N, Ghofrani HA, Hoeper MM, Lang IM, McLaughlin VV, Preiss R, Simonneau G, Sitbon O, Tapson VF. Association of N-Terminal Pro Brain Natriuretic Peptide and Long-Term Outcome in Patients With Pulmonary Arterial Hypertension. *Circulation.* 2019 May 21;139(21):2440-2450.

123. DuBrock HM, Salgia RJ, Sussman NL, Bartolome SD, Kadry Z, Mulligan DC, Jenkins S, Lackore K, **Channick RN**, Kawut SM, Krowka MJ. Portopulmonary Hypertension: A Survey of Practice Patterns and Provider Attitudes. *Transplant Direct.* 2019 May 22;5(6):e456. 31321292

124. Kohli P, Kelly VJ, Kehl EG, Rodriguez-Lopez J, Hibbert KA, Kone M, Systrom DM, Waxman AB, Venegas JG, **Channick R**, Winkler T, Harris RS. Perfusion Imaging Distinguishes Exercise Pulmonary Arterial Hypertension at Rest. *Am J Respir Crit Care Med.* 2019 Jun 1;199(11):1438-1441.

125. Wong AK, **Channick RN**. Safety and tolerability of macitentan in the management of pulmonary arterial hypertension: an update. *Drug Healthc Patient Saf.* 2019 Sep 3;11:71-85. doi: 10.2147/DHPS.S173050. eCollection 2019.

126. McLaughlin VV, **Channick R**, De Marco T, Farber HW, Gaine S, Galie N, Krasuski RA, Preston I, Souza R, Coghlan JG, Frantz RP, Hemnes A, Kim NH, Lang IM, Langleben D, Li M, Sitbon O, Tapson V, Frost A. Results of an Expert Consensus Survey on the Treatment of Pulmonary Arterial Hypertension With Oral Prostacyclin Pathway Agents. *Chest.* 2019 Nov 16. pii: S0012-3692(19)34214-X. doi: 10.1016/

127. **Channick RN**, Saggar R. Rebuttal From Drs Channick and Saggar. *Chest.* 2019 Dec;156(6):1047-1048.

128. Channick RN, Saggar R. COUNTERPOINT: Should Initial Combination Therapy Be the Standard of Care in Pulmonary Arterial Hypertension? No. *Chest.* 2019 Dec;156(6):1043-1045.

129. Rahaghi FN, Winkler T, Kohli P, Nardelli P, Martí-Fuster B, Ross JC, Radhakrishnan R, Blackwater T, Ash SY, de La Bruere I, Diaz AA, Channick RN, Harris RS, Washko GR, San José Estépar R. Quantification of the Pulmonary Vascular Response to Inhaled Nitric Oxide Using Noncontrast Computed Tomography Imaging. *Circ Cardiovasc Imaging.* 2019 Dec;12(1):e008338. doi: 10.1161/

130. Samokhin AO, Hsu S, Yu PB, Waxman AB, Alba GA, Wertheim BM, Hopkins CD, Bowman F, Channick RN, Nikolic I, Faria-Urbina M, Hassoun PM, Leopold JA, Tedford RJ, Ventetuolo CE, Leary PJ, Maron BA. Circulating NEDD9 is increased in pulmonary arterial hypertension: A multicenter, retrospective analysis. *J Heart Lung Transplant.* 2020 Apr;39(4):289-299

131. Sitbon O, Chin KM, Channick RN, Benza RL, Di Scala L, Gaine S, Ghofrani HA, Lang IM, McLaughlin VV, Preiss R, Rubin LJ, Simonneau G, Tapson VF, Galiè N, Hoeper MM. Risk assessment in pulmonary arterial hypertension: Insights from the GRIPHON study. *J Heart Lung Transplant.* 2020 Apr;39(4):300-309

132. Hon S, Channick RN, Farber HW. Unilateral Chronic Thromboembolic Pulmonary Disease: A Mimic of Pulmonary Artery Agenesis. *Am J Respir Crit Care Med.* 2020 May 15;201

133. Jasuja S, Channick RN. Post-Intensive Care Unit Follow-up of Pulmonary Embolism. *Crit Care Clin.* 2020 Jul;36(3):561-570

134. Sherman AE, Moriarty JM, Yang EH, Ravi D, Chang SY, Channick RN. Free-Floating Right Atrial Thrombus Removed by Aspiration Thrombectomy under Transesophageal Guidance. *Am J Respir Crit Care Med.* 2020 Jul 1;202

135. Hong J, Arneson D, Umar S, Ruffenach G, Cunningham CM, Ahn IS, Diamante G, Bhetraratana M, Park JF, Said E, Huynh C, Le T, Medzikovic L, Humbert M, Soubrier F, Montani D, Girerd B, Trégouët DA, Channick R, Saggar R, Eghbali M, Yang X. Single-cell Study of Two Rat Models of Pulmonary Arterial Hypertension Reveals Connections to Human Pathobiology and Drug Repositioning. *Am J Respir Crit Care Med.* 2020 Oct 6. D

136. Rosovsky RP, Grodzin C, Channick R, Davis GA, Giri JS, Horowitz J, Kabrhel C, Lookstein R, Merli G, Morris TA, Rivera-Lebron B, Tapson V, Todoran TM, Weinberg AS, Rosenfield K; Diagnosis and Treatment of Pulmonary Embolism During the Coronavirus Disease 2019 Pandemic: A Position Paper From the National PERT Consortium. *PERT Consortium.Chest.* 2020 Aug 27:S0012-3692(20)34287-2.

137. DuBrock HM, Cartin-Ceba R, Channick RN, Kawut SM, Krowka MJ. Gender Differences in Portopulmonary Hypertension. *Chest.* 2020 Aug 13:S0012-3692(20)32197-8

138. Jasuja S, Channick RN. Post-Intensive Care Unit Follow-up of Pulmonary Embolism. *Crit Care Clin.* 2020 Jul;36(3):561-570.

139. Rahaghi FN, Trieu M, Shaikh F, Abtin F, Diaz AA, Liang LL, Barjaktarevic I, **Channick RN**, San José Estépar R, Washko GR, Saggar R. Evolution of Obstructive Lung Function in Advanced Pulmonary Arterial Hypertension. *Am J Respir Crit Care Med.* 2021; 204: 1478-1481. PMID: 34555310 No abstract available.

140. Rali P, Sacher D, Rivera-Lebron B, Rosovsky R, Elwing JM, Berkowitz J, Mina B, Dalal B, Davis GA, Dudzinski DM, Duval A, Ichinose E, Kabrhel C, Kapoor A, Lio KU, Lookstein R, McDaniel M, Melamed R, Naydenov S, Sokolow S, Rosenfield K, Tapson V, Bossone E, Keeling B, **Channick R**, Ross CB. Interhospital Transfer of Patients With Acute Pulmonary Embolism (PE): Challenges and Opportunities. *Chest.* 2021 Jul 14:S0012-3692(21)01336-2. doi: 10.1016/j.chest.2021.07.013. Online ahead of print.

141. Kerr KM, Elliott CG, Chin K, Benza RL, **Channick RN**, Davis RD, He F, LaCroix A, Madani MM, McLaughlin VV, Park M, Robbins IM, Tapson VF, Terry JR, Test VJ, Jain S, Auger WR. Results From the United States Chronic Thromboembolic Pulmonary Hypertension Registry: Enrollment Characteristics and 1-Year Follow-up. *Chest.* 2021 Jun 4:S0012-3692(21)01083-7. doi: 10.1016/j.chest.2021.05.052. Online ahead of print. PMID: 34090871

142. Saggar R, Giri PC, Deng C, Johnson D, McCloy MK, Liang L, Shaikh F, Hong J, **Channick RN**, Shapiro SS, Lynch JP, Belperio JA, Weigt SS, Ramsey AL, Ross DJ, Sayah DM, Shino MY, Derhovanessian A, Sherman AE, Saggar R. Significance of autoimmune disease in severe pulmonary hypertension complicating extensive pulmonary fibrosis: a prospective cohort study. *Pulm Circ.* 2021 May 2;11(2):20458940211011329. doi: 10.1177/20458940211011329. eCollection 2021 Apr-Jun. PMID: 33996029 Free PMC article.

143. Saggar R, Abtin F, **Channick R**. Inhaled Treprostinil in Group 3 Pulmonary Hypertension. *N Engl J Med.* 2021 May 13;384(19):1870. doi: 10.1056/NEJMc2103465. PMID: 33979498 No abstract available.

144. Kerr KM, Elliott CG, Benza RL, **Channick RN**, Chin KM, Davis RD, Jain S, LaCroix AZ, Madani MM, McLaughlin VV, Park MH, Tapson VF, Auger WR. The United States Chronic Thromboembolic Pulmonary Hypertension Registry: Protocol for a Prospective, Longitudinal Study. *JMIR Res Protoc.* 2021 May 25;10(5):e25397. doi: 10.2196/25397. PMID: 33848258 Free PMC article.

145. Ghattas C, **Channick RN**, Wright CD, Vlahakes GJ, Channick C. Vascular Endobronchial Ultrasound in a Patient With Chronic Thromboembolic Pulmonary Hypertension. *J Bronchology Interv Pulmonol.* 2021 Apr 1;28(2):e23-e26. doi: 10.1097/LBR.0000000000000713. PMID: 33753706 No abstract available.

146. **Channick RN**. The Pulmonary Embolism Response Team: Why and How? *Semin Respir Crit Care Med.* 2021 Apr;42(2):212-217. doi: 10.1055/s-0041-1722963. Epub 2021 Feb 16. PMID: 33592652

147. Gaine S, Sitbon O, **Channick RN**, Chin KM, Sauter R, Galiè N, Hoeper MM, McLaughlin VV, Preiss R, Rubin LJ, Simonneau G, Tapson V, Ghofrani HA, Lang I. Relationship Between Time From Diagnosis and Morbidity/Mortality in Pulmonary Arterial Hypertension: Results From the

Phase III GRIPHON Study. Chest. 2021 Jul;160(1):277-286. doi: 10.1016/j.chest.2021.01.066. Epub 2021 Feb 3.PMID: 33545163 Free article.

148. Alba GA, Samokhin AO, Wang RS, Zhang YY, Wertheim BM, Arons E, Greenfield EA, Lundberg Slingsby MH, Ceglowski JR, Haley KJ, Bowman FP, Yu YR, Haney JC, Eng G, Mitchell RN, Sheets A, Vargas SO, Seo S, **Channick RN**, Leary PJ, Rajagopal S, Loscalzo J, Battinelli EM, Maron BANEDD9 Is a Novel and Modifiable Mediator of Platelet-Endothelial Adhesion in the Pulmonary Circulation. Am J Respir Crit Care Med. 2021 Jun 15;203(12):1533-1545. doi: 10.1164/rccm.202003-0719OC.PMID: 33523764

149. Labin JE, Saggar R, Yang EH, Lluri G, Sayah D, **Channick R**, Ardehali A, Aksoy O, Parikh RV. Left main coronary artery compression in pulmonary hypertension. Catheter Cardiovasc Interv. 2021 Jun 1;97(7):E956-E966. doi: 10.1002/ccd.29401. Epub 2020 Nov 25.PMID: 33241630

150. Johnson SW, Witkin A, Rodriguez-Lopez J, **Channick R**. Room for improvement in pulmonary capillary wedge pressure reporting: a review of hemodynamic tracings at a large academic medical center. Pulm Circ. 2020 Nov 11;10(4):2045894020929157. doi: 10.1177/2045894020929157. eCollection 2020 Oct-Dec.PMID: 33240481

151. Hong J, Arneson D, Umar S, Ruffenach G, Cunningham CM, Ahn IS, Diamante G, Bhetraratana M, Park JF, Said E, Huynh C, Le T, Medzikovic L, Humbert M, Soubrier F, Montani D, Girerd B, Trégouët DA, **Channick R**, Saggar R, Eghbali M, Yang X. Single-Cell Study of Two Rat Models of Pulmonary Arterial Hypertension Reveals Connections to Human Pathobiology and Drug Repositioning. Am J Respir Crit Care Med. 2021 Apr 15;203(8):1006-1022. doi: 10.1164/rccm.202006-2169OC. PMID: 33021809

152. Merli G, Morris TA, Rivera-Lebron B, Tapson V, Todoran TM, Weinberg AS, Rosenfield K; Rosovsky RP, Grodzin C, **Channick R**, Davis GA, Giri JS, Horowitz J, Kabrhel C, Lookstein R, PERT Consortium. Diagnosis and Treatment of Pulmonary Embolism During the Coronavirus Disease 2019 Pandemic: A Position Paper From the National PERT Consortium. Chest. 2020 Dec;158(6):2590-2601. doi: 10.1016/j.chest.2020.08.2064. Epub 2020 Aug 27.PMID: 32861692

153. DuBrock HM, Cartin-Ceba R, **Channick RN**, Kawut SM, Krowka MJ. Sex Differences in Portopulmonary Hypertension.Chest. 2021 Jan;159(1):328-336. doi: 10.1016/j.chest.2020.07.081. Epub 2020 Aug 13.PMID: 32798521

154. Marra AM, Sherman AE, Salzano A, Guazzi M, Saggar R, Squire IB, Cittadini A, **Channick RN**, Bossone E. Right side of the heart pulmonary circulation unit involvement in left-sided heart failure: Diagnostic, Prognostic, and therapeutic implications. Chest 2022; 161: 535-551.

155. Galie N, Gaine S, **Channick R**, Coughlan JG, Hoeper MM, Lang IM, McLaughlin VV, Lassen C, Rubin LJ. Long-term survival, safety and tolerability with selexipag in patients with pulmonary arterial hypertension: Results from the GRIPHON and its open label extension. Adv Ther 2022; 39: 796-810.

156. Frantz RP, Benza RL, **Channick RN**, Chin K, Howard LS, McLaughlin VV, Sitbon O, Zamanian RT, Hemnes AR, Cravets M, Bruey JM, Roscigno R, Mottola D, Elman E, Zisman LS, Ghofrani

HA. TORREY, a phase 2 study to evaluate the efficacy and safety of inhaled seralutinib for the treatment of pulmonary arterial hypertension. *Pulm Circ* 2021; 11: PMID 34790348

157. Vonk Noordegraaf A, **Channick R**, Cottreel E, Kiely DG, Marcus JT, Martin N, Moiseeva O, Peacock A, Swift AJ, Tawakol A, Torbicki A, Rosenkranz S, Galiè N. The REPAIR Study: Effects of Macitentan on RV Structure and Function in Pulmonary Arterial Hypertension. *JACC Cardiovasc Imaging*. 2022 Feb;15(2):240-253. doi: 10.1016/j.jcmg.2021.07.027. Epub 2021 Nov 17.

158. Rosenkranz S, **Channick R**, Chin KM, Jenner B, Gaine S, Galiè N, Ghofrani HA, Hoeper MM, McLaughlin VV, Du Roure C, Rubin LJ, Sitbon O, Tapson V, Lang IM. The impact of comorbidities on selexipag treatment effect in patients with pulmonary arterial hypertension: insights from the GRIPHON study. *Eur J Heart Fail*. 2022 Jan;24(1):205-214. doi: 10.1002/ejhf.2369. Epub 2021 Nov 21. PMID: 34806261

159. Sherman AE, Saggar R, **Channick RN**. Update on Medical Management of Pulmonary Arterial Hypertension. *Cardiol Clin*. 2022 Feb;40(1):13-27. doi: 10.1016/j.ccl.2021.08.002. PMID: 34809914 Review.

160. Morris TA, Fernandes TM, **Channick R**. How we do it: evaluation of dyspnea and exercise intolerance after acute pulmonary embolism. *Chest*. 2022 Jul 2:S0012-3692(22)01215-6. doi: 10.1016/j.chest.2022.06.036. PMID: 3579218

161. Souza R, Delcroix M, Galié N, Jansa P, Mehta S, Pulido T, Rubin L, Sastry BKS, Simonneau G, Sitbon O, Torbicki A, Boyanova N, Chamitava L, Stein C, **Channick RN**. Long-Term Safety, Tolerability and Survival in Patients with Pulmonary Arterial Hypertension Treated with Macitentan: Results from the SERAPHIN Open-Label Extension. *Adv Ther*. 2022 Jul 12. doi: 10.1007/s12325-022-02199-x.

162. Agarwal MA, Dhaliwal JS, Yang EH, Aksoy O, Press M, Watson K, Ziaeian B, Fonarow GC, Moriarty JM, Saggar R, **Channick R**. Sex Differences in Outcomes of Percutaneous Pulmonary Artery Thrombectomy in Patients With Pulmonary Embolism. *Chest*. 2023 Jan;163(1):216-225. doi: 10.1016/j.chest.2022.07.020. Epub 2022 Aug 2. PMID: 35926721.

163. **Channick R**, Robert Naeije. A Right Heart Catheterization for the Diagnosis of Pulmonary Hypertension: Yes, But How? *Chest*. 2022 Sep;162(3):511-513. doi: 10.1016/j.chest.2022.04.153. PMID: 36088092.

164. McLaughlin VV, **Channick RN**, Lynam KSB, Oudiz RJ, Selej M, Tapson VF, Rubin LJ. Using a knowledge translation program to facilitate guideline- and evidence-based patient management: the PAH-QuERI Extension Program. *Pulm Circ*. 2022 Jul 1;12(3):e12134. doi: 10.1002/pul.212134. PMID: 36172596; PMCID: PMC9469640.

165. McLaughlin VV, **Channick R**, Kim NH, Frantz RP, McConnell JW, Melendres-Groves L, Miller C, Ravichandran A, Rodriguez-Lopez J, Brand M, Leroy S, Wetherill G, Chin KM. Safety of macitentan for the treatment of pulmonary hypertension: Real-world experience from the

OPsumit® USers Registry (OPUS) and OPsumit® Historical USers cohort (OrPHeUS). *Pulm Circ.* 2022 Oct 1;12(4):e12150. doi: 10.1002/pul2.12150. PMID: 36381290; PMCID: PMC9661363.

166. Mei JY, **Channick RN**, Afshar Y. Pregnancy and Pulmonary Hypertension: From Preconception and Risk Stratification Through Pregnancy and Postpartum. *Heart Fail Clin.* 2023 Jan;19(1):75-87. doi: 10.1016/j.hfc.2022.08.019. PMID: 36435575.

167. Winkler T, Kohli P, Kelly VJ, Kehl EG, Witkin AS, Rodriguez-Lopez JM, Hibbert KA, Kone MT, Systrom DM, Waxman AB, Venegas JG, **Channick RN**, Harris RS. Perfusion imaging heterogeneity during NO inhalation distinguishes pulmonary arterial hypertension (PAH) from healthy subjects and has potential as an imaging biomarker. *Respir Res.* 2022 Dec 1;23(1):325. doi: 10.1186/s12931-022-02239-8. PMID: 36457013; PMCID: PMC9714016.

168. Coghlan JG, Gaine S, **Channick R**, Chin KM, du Roure C, Gibbs JSR, Hoeper MM, Lang IM, Mathai SC, McLaughlin VV, Mitchell L, Simonneau G, Sitbon O, Tapson VF, Galie N. Early selexipag initiation and long-term outcomes: insights from randomised controlled trials in pulmonary arterial hypertension. *ERJ Open Res.* 2023 Jan 16;9(1):00456-2022. doi: 10.1183/23120541.00456-2022. PMID: 36687361; PMCID: PMC9841313.

169. Louw E, Baines N, Maarman G, Osman M, Sigwadhi L, Irusen E, Koegelenberg C, Doubell A, Nathan S, **Channick R**, Allwood B. The prevalence of pulmonary hypertension after successful tuberculosis treatment in a community sample of adult patients. *Pulm Circ.* 2023 Jan 1;13(1):e12184. doi: 10.1002/pul2.12184. PMID: 36699148; PMCID: PMC9852678.

170. Kim NH, Chin KM, McLaughlin VV, DuBrock H, Restrepo-Jaramillo R, Safdar Z, MacDonald G, Martin N, Rosenberg D, Solonets M, **Channick R**. Safety of Macitentan for the Treatment of Portopulmonary Hypertension: Real-World Evidence from the Combined OPUS/OrPHeUS Studies. *Pulm Ther.* 2024 Mar;10(1):85-107. doi: 10.1007/s41030-023-00251-x. Epub 2024 Jan 7. PMID: 38184507; PMCID: PMC10881949.

171. Torbicki A, **Channick R**, Galie N, Kiely DG, Moceri P, Peacock A, Swift AJ, Tawakol A, Vonk Noordegraaf A, Flores D, Martin N, Rosenkranz S. Effect of Macitentan in Pulmonary Arterial Hypertension and the Relationship Between Echocardiography and cMRI Variables: REPAIR Echocardiography Sub-study Results. *Cardiol Ther.* 2024 Mar;13(1):173-190. doi: 10.1007/s40119-023-00345-2. Epub 2024 Jan 28. PMID: 38281309; PMCID: PMC10899124.

172. Kiely DG, **Channick R**, Flores D, Galie N, MacDonald G, Marcus JT, Mitchell L, Peacock A, Rosenkranz S, Tawakol A, Torbicki A, Vonk Noordegraaf A, Swift AJ. Comparison of cardiac magnetic resonance imaging, functional and haemodynamic variables in pulmonary arterial hypertension: insights from REPAIR. *ERJ Open Res.* 2024 Feb 12;10(1):00547-2023. doi: 10.1183/23120541.00547-2023. PMID: 38348238; PMCID: PMC10860210.

173. Mohr K, Keeling B, Kaier K, Neusius T, Rosovsky RP, Moriarty JM, Rosenfield K, Abele C, Farmakis IT, Keller K, Barco S, **Channick RN**, Giri JS, Lookstein RA, Todoran TM, Christodoulou KC, Hobohm L, Lanno M, Reed J, Binder H, Konstantinides SV, Valerio L, Secemsky EA. Modelling costs of interventional pulmonary embolism treatment: implications of

US trends for a European healthcare system. Eur Heart J Acute Cardiovasc Care. 2024 Jun 30;13(6):501-505. doi: 10.1093/ehjacc/zuae019. PMID: 38349225; PMCID: PMC11214584.

174. **Channick R**, Chin KM, McLaughlin VV, Lammi MR, Zamanian RT, Turricchia S, Ong R, Mitchell L, Kim NH. Macitentan in Pulmonary Arterial Hypertension Associated with Connective Tissue Disease (CTD-PAH): Real-World Evidence from the Combined OPUS/OrPHeUS Dataset. Cardiol Ther. 2024 Jun;13(2):315-339. doi: 10.1007/s40119-024-00361-w. Epub 2024 Mar 7. PMID: 38451426; PMCID: PMC11093922.

175. O'Meara K, Stone G, Buch E, Brownstein A, Saggar R, **Channick R**, Sherman AE, Bender A. Atrial Arrhythmias in Patients With Pulmonary Hypertension. Chest. 2024 Jul;166(1):201-211. doi: 10.1016/j.chest.2024.03.002. Epub 2024 Mar 5. PMID: 38453002.

176. Harder EM, Abtin F, Nardelli P, Brownstein A, **Channick RN**, Washko GR, Goldin J, San José Estépar R, Rahaghi FN, Saggar R. Pulmonary Hypertension in Idiopathic Interstitial Pneumonia Is Associated with Small Vessel Pruning. Am J Respir Crit Care Med. 2024 May 1;209(9):1170-1173. doi: 10.1164/rccm.202312-2343LE. PMID: 38502314; PMCID: PMC11092950.

177. Frantz RP, McLaughlin VV, Sahay S, Escribano Subías P, Zolty RL, Benza RL, **Channick RN**, Chin KM, Hemnes AR, Howard LS, Sitbon O, Vachiéry JL, Zamanian RT, Cravets M, Roscigno RF, Mottola D, Osterhout R, Bruey JM, Elman E, Tompkins CA, Parsley E, Aranda R, Zisman LS, Ghofrani HA; TORREY Study Investigators. Seralutinib in adults with pulmonary arterial hypertension (TORREY): a randomised, double-blind, placebo-controlled phase 2 trial. Lancet Respir Med. 2024 Jul;12(7):523-534. doi: 10.1016/S2213-2600(24)00072-9. Epub 2024 May 2. PMID: 38705167.

178. Brownstein AJ, Wilkinson JD, Liang LL, **Channick RN**, Saggar R, Kim A. Immature reticulocyte fraction: A novel biomarker of hemodynamic severity in pulmonary arterial hypertension. Pulm Circ. 2024 Aug 5;14(3):e12421. doi: 10.1002/pul2.12421. PMID: 39105130; PMCID: PMC11298897.

179. Brownstein AJ, Mura M, Ruffenach G, **Channick RN**, Saggar R, Kim A, Umar S, Eghbali M, Yang X, Hong J. Dissecting the lung transcriptome of pulmonary fibrosis-associated pulmonary hypertension. Am J Physiol Lung Cell Mol Physiol. 2024 Oct 1;327(4):L520-L534. doi: 10.1152/ajplung.00166.2024. Epub 2024 Aug 13. PMID: 39137526; PMCID: PMC11482468.

180. Hong J, Medzikovic L, Sun W, Wong B, Ruffenach G, Rhodes CJ, Brownstein A, Liang LL, Aryan L, Li M, Vadgama A, Kurt Z, Schwantes-An TH, Mickler EA, Gräf S, Eyries M, Lutz KA, Pauciulo MW, Trembath RC, Perros F, Montani D, Morrell NW, Soubrier F, Wilkins MR, Nichols WC, Aldred MA, Desai AA, Trégoüët DA, Umar S, Saggar R, **Channick R**, Tuder RM, Geraci MW, Stearman RS, Yang X, Eghbali M. Integrative Multiomics in the Lung Reveals a Protective Role of Asporin in Pulmonary Arterial Hypertension. Circulation. 2024 Oct 15;150(16):1268-1287. doi: 10.1161/CIRCULATIONAHA.124.069864. Epub 2024 Aug 21. PMID: 39167456; PMCID: PMC11473243.

181. Shlobin OA, Adir Y, Barbera JA, Cottin V, Harari S, Jutant EM, Pepke-Zaba J, Ghofrani HA, **Channick R**. Pulmonary hypertension associated with lung diseases. Eur Respir J. 2024 Oct

31;64(4):2401200. doi: 10.1183/13993003.01200-2024. PMID: 39209469; PMCID: PMC11525344.

182. Chin KM, **Channick R**, Kim NH, MacDonald G, Ong R, Martin N, Senatore A, McLaughlin VV. Macitentan and Tadalafil Combination Therapy in Incident and Prevalent Pulmonary Arterial Hypertension: Real-World Evidence from the OPUS/OrPHeUS Studies. *Adv Ther*. 2024 Nov;41(11):4205-4227. doi: 10.1007/s12325-024-02964-0. Epub 2024 Sep 24. PMID: 39316293; PMCID: PMC11480149.

183. Kim NH, **Channick R**, Delcroix M, Madani M, Pepke-Zaba J, Borissoff JI, Easton V, Gesang S, Richard D, Ghofrani HA. Efficacy and safety of selexipag in patients with inoperable or persistent/recurrent CTEPH (SELECT randomised trial). *Eur Respir J*. 2024 Oct 3;64(4):2400193. doi: 10.1183/13993003.00193-2024. PMID: 39326918; PMCID: PMC11447286.

184. Mounsey LA, Alape Moya D, Wright C, Langer N, Stone JR, **Channick R**, Wong AK, Rodriguez-Lopez J, Witkin AS. Association Between Thrombus Histopathology and Hemodynamic Outcomes Among Patients With Chronic Thromboembolic Pulmonary Hypertension Undergoing Pulmonary Endarterectomy. *Chest*. 2024 Oct 23:S0012-3692(24)05395-9. doi: 10.1016/j.chest.2024.10.018. Epub ahead of print. PMID: 39454997.

185. Flynn S, Chen H, Kerbel R, Gupta S, Jasuja S, Saggar R, **Channick R**, Sherman A. Management and outcomes in pulmonary arterial hypertension patients with sepsis. *BMC Pulm Med*. 2024 Oct 28;24(1):538. doi: 10.1186/s12890-024-03355-5. PMID: 39468558; PMCID: PMC11520816.

186. Chin KM, **Channick R**, Kim NH, Ong R, Turricchia S, Martin N, Mitchell L, McLaughlin VV. Macitentan in Pulmonary Arterial Hypertension Due to Congenital Heart Disease (CHD-PAH): Real-World Evidence from the OPUS/OrPHeUS Studies. *Cardiol Ther*. 2024 Dec;13(4):775-796. doi: 10.1007/s40119-024-00386-1. Epub 2024 Nov 25. PMID: 39585521; PMCID: PMC11607228.

CHAPTERS

1. **Channick RN**. Legionnaires' Disease. In *Manual of Clinical Problems in Pulmonary Medicine*. Bordow RA, Moser KM, eds. Third edition. Little Brown and Company, 1991, pages 138-141.
2. **Channick RN**. Primary pulmonary hypertension. *Atlas of Heart Diseases*, eds. Braunwald E, Current Medicine 1995; Volume 3, pgs 4.1-4.20.
3. Fedullo PF, Auger WR, **Channick RN**, Jamieson SW, Moser KM. A multi-disciplinary approach to chronic thromboembolic pulmonary hypertension. *Atlas of Heart Diseases*, Vol. III, eds. Goldhaber and Braunwald; Current Medicine 1995; pgs. 7.2-7.25
4. Fedullo PF, Auger WR, **Channick RN**, Moser KM, Jamieson SW. Chronic thromboembolic pulmonary hypertension. *Clinics Chest Medicine*, eds. Tapson VF. WB Saunders 1995; Volumes 16, pgs. 353-374.
5. **Channick RN**. Pulmonary hypertension. *Manual of Clinical Problems in Pulmonary Medicine*. Bordow RA, Moser KM, eds. Fourth edition. Little Brown and Company, 1995; pp. 477-485.

6. **Channick RN**, Auger WR, Fedullo PF, Moser KM, Buchbinder M. Pulmonary angioscopy. In *Textbook of Bronchoscopy*, eds. Fein and Feinsilver. William and Wilkins 1995; pp. 477-485.
7. Fedullo PF, Auger WR, **Channick RN**. Pulmonary Hypertension. Cardiac Intensive Care, eds. David Brown. Saunders, 1998; pp. 493-504.
8. **Channick RN**, Rubin LJ. Pulmonary Hypertension: Pathogenesis and Etiology. Manual of Clinical Problems in Pulmonary Medicine. 5th edition. RA Bordow, AL Ries, TA Morris eds. Lippincott William & Wilkins Publishers, Philadelphia PA 2000, pp. 354-358.
9. **Channick RN**, Rubin LJ. Pulmonary Hypertension: Diagnosis and Treatment. Manual of Clinical Problems in Pulmonary Medicine. 5th edition. RA Bordow, AL Ries, TA Morris eds. Lippincott William & Wilkins Publishers, Philadelphia PA 2000, pp. 354-358.
10. **Channick RN**, Rubin LJ. Pulmonary Vasodilators. Asthma and COPD. PJ Barnes, J Drazen, S Rennard, N Thomson eds. Academic Press Publishers 2002;pp. 605-610.
11. **Channick RN**, Fedullo PF. Chronic thromboembolic pulmonary hypertension. In Venous Thromboembolism. Lung Biology in Health and Disease JE Dalen ed. Marcel Dekker 2003.
12. Helmersen D, **Channick RN**, Rubin LJ. Endothelin receptor antagonists. In Pulmonary Circulation; ed. AJ Peacock and LJ Rubin; 2004: 294-301
13. Chin K, **Channick RN**, Rubin LJ. Pulmonary Hypertension in Manual of Clinical Problems in Pulmonary Medicine, 6th edition. 2005.
14. **Channick RN**, Rubin LJ. Pulmonary Vasculitis and Primary Pulmonary Hypertension. Textbook of Respiratory Medicine; ed. Murray and Nadel. 2005
15. **Channick RN**. Pulmonary Hypertension. In *Pulmonary/Respiratory Therapy Secrets*. Parsons P and Heffner J eds.; 2006: 295-300.
16. **Channick RN** and Rubin LJ. Primary Pulmonary Hypertension. In *Textbook of Respiratory Diseases*, Murray J and Nadel J eds. 2010
17. Chin K and **Channick RN**. Pulmonary Hypertension. In *Textbook of Respiratory Diseases*. Murray and Nadel eds. 2014.

REVIEWS

1. Fedullo PF, Auger WR, **Channick RN**, Moser KM, Jamieson SW. Surgical management of pulmonary embolism. *Lung Biology in Health and Disease*, 1994. Vol 75;223-240.

2. Auger WR, Fedullo PF, **Channick RN**, Moser KM. Pulmonary embolism: when the acute becomes chronic. Emergency Medicine 1994;June:19-42.
3. **Channick RN**. Improvement in pulmonary hypertension and hypoxemia during nitric oxide inhalation in a patient with end-stage pulmonary fibrosis. Search on Pulmonology 1995;5:19-24.
4. Auger WR, **Channick RN**, Kerr KM, Fedullo PF. Evaluation of patients with suspected chronic thromboembolic pulmonary hypertension. Seminars in Thoracic and Cardiac Surgery 1999;11;2:179-190.
5. **Channick RN**, Rubin LJ.;New and experimental therapies for pulmonary hypertension. Clinics in Chest Medicine 2001;22(3):539-545.
6. Chin K, **Channick R**. Bosentan. Expert Rev Cardiovasc Ther 2004; 2:175-182.
7. Lee S, **Channick RN**, Rubin LJ. Endothelin receptor antagonists. Semin Respir Crit Care Med. 2005 Aug;26(4):402-8.
8. Desai SA, **Channick RN**. Exercise in patients with pulmonary arterial hypertension. J Cardiopulm Rehabil Prev. 2008 Jan-Feb;28(1):12-6.
9. Croom KF, Curran MP, Abman SH, **Channick RN**, Heresi GA, Rubin LJ, Torbicki A. Sildenafil: a review of its use in pulmonary arterial hypertension. Drugs. 2008;68(3):383-97.
10. DuBrock HM, **Channick RN**. Macitentan for the treatment of pulmonary arterial hypertension. Expert Rev Respir Med 2014; 8:393-9.
11. LeVarge BL, **Channick RN**. Chronic thromboembolic pulmonary hypertension: evolution in management. Curr Opin Pulm Med 2014; 20:400-8.
12. DuBrock HM, **Channick RN**, Krowka MJ. Whats new in the treatment of portopulmonary hypertension? Expert Rev Gastroenterol Hepatol 2015; 9:983-92.
13. Witkin AS, **Channick RN**. Chronic thromboembolic pulmonary hypertension: the end result of pulmonary embolism Curr Cardiol Rep 2015; 17:63.
14. LeVarge BL, **Channick RN**. The changing paradigm in pulmonary hypertension trials: longer duration, new endpoints. Curr Opin Pulm Med 2015; 21:438-45.
15. Wilcox SR, Kabrhel C, **Channick RN**. Pulmonary hypertension and right ventricular failure in emergency medicine. Ann Emerg Med 2015;66:619-28.
16. Kratzert WB, Boyd EK, Saggar R, **Channick R**. Critical Care of Patients After Pulmonary Thromboendarterectomy. J Cardiothorac Vasc Anesth. 2019 Mar 8

EDITORIALS

1. **Channick RN**, Rubin LJ. Combination therapy for pulmonary hypertension: A glimpse into the future? Crit Care Med 2000; 28:896-897 (editorial).
2. Bailey CL, **Channick RN**, Rubin LJ. A new era in the treatment of primary pulmonary hypertension. Heart 2000; 85:251-252. (editorial).

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CURRENT EMPLOYMENT

2008 - Present **Managing Partner** **OSKR, LLC** **Emeryville, CA**
Patent valuation and business strategy expert with over 25 years of experience analyzing patents, business opportunities and risks. Consult for clients on complex damages and licensing issues with a particular focus on technology companies. www.oskr.com

PRIOR EXPERIENCE

2014 – 2020 **Adjunct Professor** **Golden Gate University** **San Francisco, CA**
Taught a graduate-level course in the School of Accounting on damages.

2001 – 2007 **Principal** **LECG, LLC** **Emeryville, CA**

1997 – 1999 Primarily consulted for companies on damages issues arising from allegations of antitrust and intellectual property infringement.

2005 **Office Director**
Responsible for the operations of a 90-person office including reviews, hiring, firing, promotions, morale and general administration.

2001 - 2005 **Special Assistant to the Chairman, Strategy**
Advised the Chairman on corporate acquisitions and general strategic direction.

2000 - 2001 **Managing Director** **SCIENT** **San Francisco, CA**
Joined corporate strategy group to help design and implement a turn-around for this Internet consulting firm. Responsible for company organizational transition.

1999 - 2000 **VP Operations** **KENMEA** **San Francisco, CA**
Helped develop strategy and business plan for an Internet software startup. Managed the operations of the company as we grew from 4 to 25 people.

1996 - 1997 **Principal** **MANAGEMENT RESOURCES** **Berkeley, CA**
Independent consultant performing due diligence and analyses of startup high-tech business opportunities.

1995 – 1996 **Vice President** **WALT DISNEY** **Glendale, CA**
Business Development **IMAGINEERING**
Evaluated new business ideas for WDI including creative concepts and technology initiatives.

1993 - 1995 **Director** **VALSPAR** **Chicago, IL**
Managed the production planning, distribution and I/T functions for the \$200 million Consumer Paint Division.

1992-1993 **Senior Associate** **BOOZ, ALLEN** **San Francisco, CA**

1990-1991 **Associate**

1987-1989 **Analyst**
Performed general business strategy and organization assignments across a wide range of industries. Exceptional (second in the history of the firm) promotion granted from Analyst to Associate waiving the usual requirement for an MBA.

1984 - 1986	Lecturer	UC BERKELEY	Berkeley, CA
	Taught an introductory computer science class.		
1986	Chief Engineer	WINDWARD YACHTS	Oakland, CA
	Responsible for the detailed design of custom yachts.		

OTHER BUSINESS EXPERIENCE

2013 – 2021	Naval Architect	Berkeley, CA
	Design custom rowing shells for open water.	
2001 - 2013	President	MAAS BOAT COMPANY
	Purchased, managed and sold a company that manufactures and sells open water rowing shells in the U.S. and around the world. Primary responsibilities were design, management, marketing, finance, and license negotiation.	
2008 – 2012	President	NAOWRC, Inc.
	Created a national championship for open water rowing that brought together rowers from around the U.S. and the world.	
2004 – 2011	President	KIDDER RACING
	Developed design brief for an innovative one-person sailing skiff. Founded company and was responsible for final design, strategy, marketing and finance.	

Board Positions

Skyflow Inc. (former), NextWindow (former), Hero Arts (Advisory Board, former), Trade New Zealand (Advisory Board, former), Berkeley Rowing Club (former)

Other

Member of the Licensing Executives Society

Member of the National Associate of Business Economists

Member of The Sedona Conference

Participant in the Stanford IP Roundtable

Booz, Allen & Hamilton Professional Excellence Award

Outstanding Graduate Student Instructor Award

Significant experience evaluating new businesses.

EDUCATION

1986	M.Sc., University of California at Berkeley
1983	B.A. with Honors, Amherst College
	Elected to Sigma Xi, National Scientific Honor Society

PUBLICATIONS & PRESENTATIONS

“Are Patents Really Options?”, *les Nouvelles Journal of the Licensing Executives Society*, V. 38(4), December 2003.

“Most Favored Licensee Clauses: Draining the Swamp” presentation at *Advanced Topics in IP Valuation* to the Intellectual Property Society, July 2004.

“Reasonable Royalties by the New Rules”, *Dunn on Damages*, Summer 2011.

“Infringer’s Profits Should Not Be the Focus of Patent Damages Cases”, *Dunn on Damages*, Fall 2011.

“Simply Wrong: The 25% Rule Examined”, *les Nouvelles Journal of the Licensing Executives Society*, December, 2011.

“For Want of Damages the Case was Tossed: Judge Posner’s Ruling in Apple v. Motorola”, *Dunn on Damages*, Fall 2012.

“Nash Bargaining and Patent Damages”, *les Nouvelles Journal of the Licensing Executives Society*, March 2014.

“Lump Sums, Running Royalties and Real Options”, *les Nouvelles Journal of the Licensing Executives Society*, December 2015.

Litigation Experience

Ossur Holdings Inc. and Generation II USA, Inc., v. Bellacure, Inc., Shane Sterling and Maurice Cannon. Before United States District Court, Western District of Washington at Seattle. Civil Action No: 05-CV-01552-CMP. Retained by counsel for plaintiffs, re: lost profits and unjust enrichment due to alleged theft of trade secrets in the medical device industry (osteoarthritis knee braces).

Google, Inc. v. American Blind & Wallpaper Factory, Inc. Before United States District Court, Northern District of California. Case No. C 03-5340 JF EAI. Retained by counsel for plaintiffs re: damages arising from Google's alleged infringement of American Blind & Wallpaper's trademarks.

Comcast Cable Communications Corporation, LLC v. Finisar Corporation. Before United States District Court for the Northern District of California. Case No. C 06-04206 WHA. Retained by counsel for plaintiffs re: damages arising from Comcast's alleged infringement of Finisar patent number 5,404,505.

Carter Bryant, an individual v. Mattel Inc. and Consolidated Actions. Before United States District Court for the Central District of California, Eastern Division. Case No. CV 04-9049 SGL (RNBx) Consolidated with Case No. CV 04-09059 Case No. CV OS02727. Retained by counsel for plaintiff re: damages arising from Mr. Bryant's alleged theft of copyrighted materials, breach of fiduciary duty and theft of trade secrets.

American Airlines, Inc. v. Google, Inc. Before United States District Court for the Northern District of Texas, Fort Worth Division. Case No. 4-07CV-487-A. Retained by counsel for defendant re: damages arising from Google's alleged infringement of American Airline's trademarks.

H. Richard Dallas, Shareholder Representative for dMarc v. Google Inc. Before JAMS, reference #1100054656. Retained by counsel for defendant re: damages arising from a breach of contract claim arising from Google's acquisition of dMarc.

Flashseats, LLC. v. Paciolan Inc. Before United States District Court, District of Delaware. Case No. CA 07-575 (JJF). Retained by counsel for defendant re: damages arising from Paciolan's alleged infringement of Flashseats' patent number 6,496,809.

Charlotte Russe Holding, Inc. v. Versatile Entertainment, Inc. and People's Liberation, Inc. Before Superior Court of the State of California, County of Los Angeles, Central District. Case No. BC424734. Retained by counsel for plaintiff re: damages arising from alleged breach of contract.

M&H Realty Partners V L.P. v. Aerojet-General Corporation, Boeing Realty Corporation, The Boeing Company, McDonnell Douglas Corporation. Before Superior Court for the State of California, County of Orange. Case No. 30-2008-00080378-CUTT-CXC. Retained by counsel for plaintiff re: damages arising from environmental contamination at a property redevelopment.

Firefly Digital, Inc. v. Google Inc. Before United States District Court, Western District of Louisiana, Lafayette Division. Case number 6:10cv00133-TLM-PJH. Retained by counsel for defendant re: damages arising from alleged trademark infringement.

American Technology, Inc., v. FrozenCPU.com, Inc. Before the United States District Court, Middle District of Florida, Orlando Division. Case Number 6:11-CV-110-ORLACC-GJK. Retained by counsel for defendant re: damages arising from alleged patent infringement.

C&C Jewelry Mfg., Inc. v. Trent West. Before United States District Court, Northern District of California, San Jose Division, Case No. 5:09-cv-01303-JF-HRL. Retained by counsel for plaintiff re: reasonable royalty damages arising from alleged patent infringement.

Pixart Imaging, Inc. v. Avago Technologies General IP (Singapore) PTE. LTD. Before United States District Court Northern District of California, San Jose Division. Case No. C 10-00544 JW. Retained by counsel for plaintiff re: additional royalties due from alleged breach of a patent license agreement.

EasyWeb Innovations, LLC. v. Twitter, Inc. Before United States District Court, Eastern District of New York. Case No. 2:11-cv-04550-JFB-WDW. Retained by counsel for defendant re: reasonable royalty damages arising from alleged patent infringement.

Oncology Tech, LLC v. Elekta AB and Elekta, Inc. Before United States District Court, Western District of Texas, San Antonio Division. Case No: 5:12-CV-00314-HLH. Retained by counsel for defendants re: damages arising from alleged breach of contract.

American Medical Response, Inc. v. Paramedics Plus, LLC. Before Superior Court of the State of California, County of Alameda. Case No: RG10541623. Retained by counsel for defendant re: damages arising from alleged low-cost bid for emergency medical services.

AMC Technology, L.L.C., v. Cisco Systems, Inc. Before United States District Court, Northern District of California, San Jose Division. Case No: C-11-03403 (PSG). Retained by counsel for plaintiff re: damages arising from alleged breach of contract.

Silicon Storage Technology, Inc. v. National Union Fire Insurance Company of Pittsburgh, PA and XL Specialty Insurance Company. Before United States District Court, Northern District of California. Case No: 5:13-CV-05658. Retained by counsel for defendants re: damages arising from a claim for theft of trade secrets.

Neustar, Inc. v. F5 Networks, Inc. Before United States District Court, Northern District of California, San Jose Division. Case No: CV12-02574. Retained by counsel for plaintiff re: damages arising from alleged breach of contract.

Qiang Wang v. Palo Alto Networks, Inc. Before United States District Court, Northern District of California, San Francisco Division. Case No: C 12-05579 WHA. Retained by counsel for defendant re: damages arising from alleged misappropriation of trade secrets and alleged patent infringement.

Affymetrix, Inc. v. Enzo Biochem Inc. Before United States District Court, Southern District of New York, Case No. 1:04-cv-01555-RJS. Retained by counsel for Plaintiffs re: damages arising from an alleged breach of contract.

Enzo BioChem, Inc. v. Affymetrix, Inc. Before United States District Court, Southern District of New York, Case No. 1:03-cv-08907-RJS. Retained by counsel for Defendants re: damages arising from an alleged breach of contract.

Wyde Voice, LLC and Free Conferencing Corporation v. Global IP Solutions, Inc. and Google Inc. Before Superior Court of the State of California, County of San Francisco, Case No. CGC-12-522868. Retained by counsel for defendants re: damages arising from an alleged breach of contract.

Alexander Stross v. ZipRealty, Inc. Before United States District Court, Western District of Texas, Austin Division. Civil Action No. A-13-CV-419-SS. Retained by counsel for defendants re: damages arising from alleged copyright infringement.

Collarity, Inc. v. Google, Inc. Before United States District Court, District of Delaware. Case No. 11-1103 MPT. Retained by counsel for defendants re: damages arising from alleged patent infringement.

TomTom International, B.V. v. Broadcom Corporation. Before United States District Court, Central District of California. Case No. 8:14-cv-00475 PA (DFMx). Retained by counsel for defendants re: damages arising from alleged breach of warranty.

In Re Google Inc. Privacy Policy Litigation. Before United States District Court, Northern District of California, San Jose Division. Case No. 12-CV-01382 PSG. Retained by counsel for Google re: damages arising from alleged breach of privacy policy.

Sarvint Technologies, Inc. v. Athos Works, Inc., and Mad Apparel, Inc. (and related cases filed by Sarvint against OMSignal, Ralph Lauren, Victoria's Secret, Textronics and adidas, and Sensoria). Before United States District Court, Northern District of Georgia, Atlanta Division. Civil Action No. 1:15-CV-00068-TCB. Retained by counsel for defendants re: irreparable harm arising from alleged patent infringement.

California Expanded Metal Products Co., v. ClarkWesternDietrich Building Systems LLC, James Klein and BlazeFrame Industries, Ltd. Before United States District Court, Central District of California, Case No. 2:12-cv-10791-DDP-MRWx. Retained by counsel for defendants re: damages arising from alleged breach of contract and patent infringement.

In Re: Multiple Listing Service Real Estate Photo Litigation. Before United States District Court, Southern District of California, Case No.: 14CV1158 BAS (JLB). Retained by counsel for defendant (CoreLogic) re: damages arising from an alleged breach of copyright.

TeleSign Corporation v. Twilio, Inc. Before United States District Court, Central District of California, Case No. 15-3240-PSG-SS. Retained by counsel for defendant re: irreparable harm in the context of a motion for preliminary injunction.

Quantum Corporation v. Crossroads Systems, Inc. Before United States District Court, Northern District of California, San Francisco Division, Case No. 3:14-cv-04293-WHA. Retained by counsel for plaintiff re: lost profits and reasonable royalty arising from alleged patent infringement.

United States of America ex rel. Floyd Landis v. Tailwind Sports Corp., Lance Armstrong and Johan Bruyneel. Before United States District Court, District of Columbia, Case No. 1:10-cv-00976 (CRC). Retained by counsel for Lance Armstrong re: benefits received by the U.S. Postal Service from its sponsorship of the USPS Cycling Team.

Integra LifeSciences Corp., Integra LifeSciences Sales LLC, Confluent Surgical, Inc., and Incept LLC, v. HyperBranch Medical Technology, Inc. Before United States District Court, District of Delaware, Case No. C.A. No. 15-1819 (LPS)(CJB). Retained by counsel for defendant re: irreparable harm in the context of a motion for preliminary injunction.

Alice Svenson, individually and on behalf of all others similarly situated, v. Google, Inc. and Google Payment Corporation. Before United States District Court, Northern District of California, Case No. CV-13-04080-BLF. Retained by counsel for defendant re: damages from alleged breach of privacy policy.

Telecom Asset Management, LLC v. Cellco Partnership d/b/a Verizon Wireless, Verizon Sourcing LLC, Verizon Corporate Resources Group LLC. Before United States District Court, Southern District of New York, Case No.: 15 Civ 2786 (SHS) (RLE). Retained on behalf of defendants re: damages from alleged breach of contract.

Celestica (USA) Inc. v. The Crossbow Group, LLC, Before JAMS, San Jose, CA. JAMS Ref. No. 1110018525. Retained by counsel for plaintiffs re: damages from alleged breach of contract.

Varentec, Inc. v. Gridco, Inc. *et al.* Before United States District Court for the District of Delaware, C.A. No. 16-217-RGA. Retained by counsel for defendants re: irreparable harm in the context of a motion for preliminary injunction.

Connectus, LLC d/b/a eDegree Advisor v. Ampush Media, Inc. and DGS Edu LLC. Before United States District Court, Middle District of Florida, Tampa Division, Case No.: 8:15-cv-02778-VMC-JSS. Retained by counsel for plaintiffs re: damages from breach of contract, unjust enrichment and unfair competition.

Doug Baird, Doug Hesse and Bob Schmitt Derivatively on Behalf of BlinkMind, Inc. v. Joe Baird, Nathan Stratton, Michael Tessler, Exario Networks, Inc., and BroadSoft, Inc. Before District Court of Harris County, Texas, 270th Judicial District, Cause No. 2015-16576. Retained by counsel for defendants Joe Baird, Nathan Stratton and BroadSoft re: damages from theft of trade secrets.

Integra LifeSciences Corp., Integra LifeSciences Sales LLC, Confluent Surgical, Inc., and Incept LLC, v. HyperBranch Medical Technology, Inc. Before United States District Court, District of Delaware, Case No. C.A. No. 15-1819 (LPS)(CJB). Retained by counsel for defendant re: damages from patent infringement.

Klaustech, LLC. v. AdMob, Inc. Before United States District Court, Northern District of California, Oakland Division. Case No. 10-CV-05899-JSW. Retained by counsel for defendant re: damages from patent infringement.

Google LLC, v. Anthony Scott Levandowski and Lior Ron. Before JAMS, San Francisco, Case No. 1100086069 & 1100086032. Retained by counsel for plaintiff re: damages from breach of contract, fraud, and disloyalty.

Express Mobile, Inc., v. Svanaco, Inc., BigCommerce, Inc. Before United States District Court For the Eastern District of Texas, Marshall Division. Retained by counsel for defendant re: damages from patent infringement.

Safeway, Inc. v. Sheppard Mullin Richter & Hampton, LLP. Before JAMS, San Francisco, Case No. 1220052996. Retained by counsel for defendant re: damages from legal malpractice.

Juliana Griffo v. Oculus VR, Inc. and Palmer Luckey. Before United States District Court, Central District of California, Southern Division (Santa Ana), Case No. 8:15-cv-01228-DOC (JCGx). Retained by counsel for defendants re: damages from copyright infringement.

Beijing Choice Electronic Technology Co., Ltd. v. Contec Medical Systems USA INC. and Contec Medical Systems Co., Ltd. Before United States District Court, Northern District of Illinois, Case No: 18-cv-00825. Retained by counsel for defendants re: irreparable harm in the context of a motion for a preliminary injunction and damages from patent infringement.

Alarm.com, Inc. and ICN Acquisition, LLC v. SecureNet Technologies, LLC. Before United States District Court, District of Delaware. Case No.: 1:15-cv-00807-GMS. Retained by counsel for defendants re: damages from patent infringement.

Ameranth, Inc. v. Mobo Systems (d/b/a Olo). Before United States District Court, Southern District of California, San Diego Division. Case No.: 3:12-cv-01642-JLS-NLS. Retained by counsel for defendant re: damages from patent infringement.

International Longshore and Warehouse Union and Pacific Maritime Association vs. ICTSI Oregon, Inc. Before the United States District Court for the District of Oregon. Case No. 3:12-cv-01058-SI. Retained by counsel for plaintiff and counterclaim defendant re: damages from labor slowdown.

International Code Council, Inc. v. UpCodes, Inc., Garrett Reynolds and Scott Reynolds. Before the United States District Court for the Southern District of New York. Case No. 1:17-cv-6261. Retained by counsel for defendants re: damages from copyright infringement.

United States of America v. Sushovan Tareque Hussain. Before the United States District Court, Northern District of California. Case No. CR 16-00462 CRB. Retained by counsel for defendant re: gains from fraud.

Nevro Corp., v. Stimwave Technologies, Inc. Before the United States District Court for the District of Delaware. Case No. 19-325 (CFC). Retained by counsel for defendant re: irreparable harm in the context of a motion for a preliminary injunction.

CellInfo, LLC v. American Tower Corporation and American Tower Do Brasil. Before American Arbitration Association, Boston Regional Office. Case No. 01-18-0004-5894. Retained by counsel for plaintiff re: damages from misappropriation of trade secrets and confidential information.

Booker T. Huffman v. Activision Publishing, Activision Blizzard and Major League Gaming Corp. Before the United States District Court for the Eastern District of Texas, Marshall Division. Case No. 2:19-cv-00050-RWS-RSP. Retained by counsel for defendant re: damages from copyright infringement.

PTP OneClick, LLC v. Avalara, Inc. Before the United States District Court, Western District of Washington at Seattle. Case No. 2:19-cv-00640-JLR. Retained by counsel for defendant re: damages from misappropriation of trade secrets and breach of contract.

Arendi S.A.R.L. v. Motorola Mobility LLC. Before the United States District Court, District of Delaware. Case No. 12-1601-LPS. Retained by counsel for defendant re: damages from patent infringement.

Arendi S.A.R.L. v. Google LLC. Before the United States District Court, District of Delaware. Case No. 13-919-LPS. Retained by counsel for defendant re: damages from patent infringement.

FurnitureDealer.net, Inc. v. Amazon.com, Inc., and COA, Inc. d/b/a Coaster Company of America. Before the United States District Court, District of Minnesota. Case No. 18-232 (JRT/HB). Retained by counsel for defendant re: copyright infringement.

Crown Building Maintenance, Inc. v. Metro Services Group, Jeff Dachenhaus, Mark Nolan and Derek Schulze. Before the Superior Court of the State of California, County of San Francisco. Case No. CGC-18-566118. Retained by counsel for plaintiffs re: damages from breach of contract and misappropriation of trade secrets.

Hong Kong Ucloudlink Network Technology Limited v. SIMO Holdings Inc. and Skyroam, Inc. Before the United States District Court, Northern District of California. Case No. 8-cv-05031. Retained by counsel for plaintiffs re: damages from patent infringement.

Fisher & Paykel Healthcare, Ltd v. Flexicare Incorporated. Before the United States District Court, Central District of California. Case No. 8:19-cv-00835-JVS-DFM. Retained by counsel for defendants re: damages from patent infringement.

Hughes & Company Construction, Inc. v. Weber Hung Family Trust. Before American Arbitration Association. Case No. 01-20-0004-8744. Retained by counsel for defendants / counterclaimants re: damages from breach of contract.

Equicare Health Inc. v. Varian Medical Systems, Inc. Before the American Arbitration Association. Case No.: 01-19-0002-4132. Retained by counsel for defendant re: damages from breach of contract.

Personalized Media Communications, LLC v. Netflix, Inc. Before the United States District Court, Eastern District of Texas, Marshall Division, Case No. 2:19-cv-00091-JRG. Retained by counsel for defendant re: damages from patent infringement.

Red Hydrogen, LLC v. CloudMinds (HK) Ltd. Before JAMS Arbitration, JAMS Ref. No. 1220062943. Retained by counsel for defendant re: factors relating to alter ego and damages from breach of contract.

USC IP Partnership, L.P., v. Facebook, Inc. Before the United States District Court for the Western District of Texas, Waco Division, Case No. 6:20-cv-00555-ADA. Retained by counsel for defendant re: damages from patent infringement.

Brad Peters, David Gray and Paul Staelin v. Infor (US), Inc. Before the United States District Court, Northern District of California, San Francisco Division, Civil Action No. 19-cv-8102 Retained by counsel for defendants / counter-claimant re: damages from breach of contract.

Netlist v. Samsung Electronics, Co., Ltd. Before United States District Court, Central District of California, Southern Division, Case No. 8:20-cv-993-MCS (ADSx). Retained by counsel for defendants re: damages from breach of contract.

Alexander Walker v. Kitty Hawk Corporation. Before JAMS, JAMS Ref. No. 1100110678. Retained by counsel for defendants re: damages from alleged fraud and breach of contract.

Contour Data Solutions, LLC. v. Gridforce Energy Management LLC, NAES Corporation, CDW Corporation, CDW Direct. Before United States District Court, Eastern District of Pennsylvania, Case No. 2:20-CV-03241. Retained by counsel for Gridforce and NAES re: breach of contract.

Rex Medical, L.P. v. Intuitive Surgical, Inc., Intuitive Surgical Operations, Inc. and Intuitive Surgical Holdings, LLC. Before United States District Court, District of Delaware, Civil Action No. 19-cv-5-MN. Retained by counsel for Rex Medical re: damages from patent infringement.

Estech Systems, Inc. v. Howard Midstream Energy Partners d/b/a Howard Energy Partners. Before United States District Court, Western District of Texas, Waco Division, Civil Action No.: 6-20-cv-00777. Retained by counsel for Howard Energy Partners re: damages from patent infringement.

Bay Materials, LLC v. 3M Company. Before United States District Court, District of Delaware, Civil Action No. 21-cv-1610-RGA-JLH. Retained by counsel for 3M Company re: irreparable harm in the context of a motion for a preliminary injunction.

RSB Spine, LLC v. DePuy Synthes Sales, Inc. and DePuy Synthes Products, Inc. Before United States District Court, District of Delaware, C.A. No. 19-1515-RGA. Retained by counsel for RSB Spine re: damages from patent infringement.

RSB Spine, LLC v. Medacta USA, Inc. Before United States District Court, District of Delaware, C.A. No. 18-1973-RGA. Retained by counsel for RSB Spine re: damages from patent infringement.

RSB Spine, LLC v. Precision Spine, Inc. Before United States District Court, District of Delaware, C.A. No. 18-1974-RGA. Retained by counsel for RSB Spine re: damages from patent infringement.

Quest Media & Supplies v. Aerojet Rocketdyne, Inc. Before Superior Court of the State of California, County of Sacramento, Case No. 34-2017-00207975. Retained by counsel for Quest Media re: damages from breach of contract.

Dennis P. Flynn v. Sara L. Flynn and Christopher J. Dressel. Before JAMS, Reference No. 1100111518. Retained by counsel for Dennis Flynn re: dissolution of partnerships and valuation of real estate interests.

AlphaSense v. Sentieo. Before United States District Court, District of Delaware, C.A. No. 21-1011-CFC. Retained by counsel for Sentieo re: irreparable harm in the context of a motion for preliminary injunction.

Cat Brooks and Rasheed Shabazz, individually and on behalf of all others similarly situated v. Thomson Reuters Corporation. Before United States District Court, Northern District of California, San Francisco Division, Case No. 3:21-cv-1418-EMC. Retained by counsel for Thomson Reuters re: unjust enrichment from an alleged breach of privacy.

WSOU Investments, LLC d/b/a Brazos Licensing and Development v. Canon Inc. and Canon USA, Inc. Before United States District Court, Western District of Texas, Waco Division, Case No. 6:20-cv-00981-ADA. Retained by counsel for Canon re: damages from patent infringement.

Xerox Corporation v. FujiFilm Business Innovation Corp. (f/k/a Fuji Xerox Co., Ltd.). Before International Court of Arbitration of the International Chamber of Commerce, Case No. 26311/PDP. Retained by counsel for Xerox re: damages from breach of contract.

Wahoo Fitness v. Swift. Before United States District Court for the District of Delaware, Case No. 1-22-cv-01295-CFC. Retained by counsel for Wahoo re: irreparable harm in the context of a motion for a preliminary injunction.

National Fire Protection Association v. UpCodes. Before United States District Court for the Central District of California, Case No. 21-5262 DSF (E). Retained by counsel for UpCodes re: harm from alleged copyright infringement.

IGT v. Zynga. Before United States District Court for the Western District of Texas, Waco Division, Case No. 6:21-CV-00331-ADA. Retained by counsel for Zynga re: damages from patent infringement.

Estech Systems IP v. Public Storage. Before United States District Court for the Eastern District of Texas, Marshall Division, Civil Action No. 2:21-CV-00483. Retained by counsel for Public Storage re: damages from patent infringement.

Metricolor v. L'Oréal. Before United States District Court, Central District of California, Civil Action No. 2:16-CV-00364. Retained by counsel for L'Oréal re: damages from misappropriation of trade secrets.

ICTSI Oregon v. International Longshore and Warehouse Union (ILWU). Before United States District Court for the District of Oregon. Case No. 3:12-cv-01058-SI. Retained by counsel for defendant re: damages from labor slowdown.

Consumeron v. Maplebear Inc. d/b/a Instacart. Before United States District Court for the District of Delaware. Civil Action No. 1:21-01147-GBW-MPT. Retained by counsel for defendant re: damages from patent infringement.

Dr. Mark A. Barry v. Stryker Corporation. Before United States District Court for the District of Delaware. Civil Action No. 20-cv-01787 (RGA). Retained by counsel for defendant re: damages from patent infringement.

Steven G. Alves v. Herbert Feinberg; Harry Feinberg; Richard Tinervin; Gotham Enterprises and Affiliates. Before Superior Court of the State of California, County of Placer. Case No. SCV0043567. Retained by counsel for defendants re: damages from alleged breach of contract and misappropriation of trade secrets.

HID Global Corporation v. Vector Flow, Inc., Ajay Jain, Vikrant Ghai and Shailendra Sharma. Before United States District Cour for the District of Delaware. C.A. No. 21-1769 (GBW). Retained by counsel for defendants re: damages from alleged patent infringement, trade secret misappropriation, breach of contract and breach of fiduciary duty.

Insulet Corporation v. EOFlow Ltd., EOFlow, Inc., Flex Ltd., Flextronics Corporation, Flextronics Medical Sales and Marketing Ltd., Luis J. Malave, Steven Dilanni, and Ian Welsford. Before United States District Court for the District of Massachusetts. Case No. 1:23-cv-11780. Retained by counsel for defendants irreparable harm in the context of a motion for preliminary injunction.

Dairy, LLC v. Milk Moovement, Inc. Before United States District Court, Eastern District of California. Case No. 2:21-cv-02233-WBS-AC. Retained by counsel for defendants / counter-claimants re: damages from anticompetitive conduct.

Sectra Communications AB v. Absolute Software Inc. and NetMotion Software, Inc. Before United States District Court for the Western District of Washington at Seattle. Case No. 2:22-cv-0353-RSM. Retained by counsel for defendants and counterclaimants re: damages from patent infringement.

Post University v. Learneo, Inc. Before United States District Court, District of Connecticut. Case No. 3:21-cv-01242 (JBA). Retained by counsel for defendants re: damages from copyright infringement.

International Business Machines Corporation v. Zynga, Inc. Before United States District Court for the District of Delaware. Case No. 22-590-GBW. Retained by counsel for defendants re: damages from patent infringement.

United Therapeutics Corporation v. Liquidia Technologies, Inc. Before United States District Court for the District of Delaware. Case No. 23-975 (RGA). Retained by counsel for defendants re: irreparable harm in the context of a motion for preliminary injunction.

Driscoll's Inc. v. California Berry Cultivars, LLC and Douglas Shaw. Before United States District Court for the Eastern District of California, Sacramento Division. Case No. 2:19-cv-00493-TLN-CKD. Retained by counsel for plaintiffs re: damages from patent infringement.

Altor Bioscience and Nantcell v. HCW Biologics and Hing C. Wong. Before JAMS, Los Angeles Resolution Center. JAMS Reference No. 5220002288. Retained by counsel for defendants re: damages from trade secret misappropriation.

United Therapeutics Corporation v. Liquidia Technologies, Inc. Before United States Court of Appeals for the Federal Circuit. Case No. 2024-1658. Retained by counsel for defendants re: irreparable harm in the context of a motion for stay.

FaceTec, Inc. v. Jumio Corporation. Before JAMS, JAMS Reference No. 5260000089. Retained by counsel for defendants and counterclaimants re: damages from breach of contract.

TrackThings, LLC v. NetGear, Inc. Before United States District Court for the District of Delaware. Case No. 1:22-cv-00981-JLH. Retained by counsel for defendants re: damages from patent infringement.

Ferring Pharmaceuticals, Inc. and Rebiotix, Inc. v. Finch Therapeutics Group, Inc., Finch Therapeutics, Inc., and Finch Therapeutics Holdings, LLC. Before United States Court for the District of Delaware. Case No. 21-1694-JLH. Retained by counsel for plaintiffs re: damages from patent infringement.

Riot Games, Inc. v. NetEase, Inc. Before the International Court of Arbitration of the International Chamber of Commerce. Retained by counsel for defendants re: irreparable harm.

Attentive Mobile, Inc. v. Stodge, Inc. (d/b/a Postscript). Before the United States Court for the District of Delaware, C.A. No. 23-87-CJB. Retained by counsel for defendant / counterclaimant re: damages from patent infringement and commercial acceptability of a non-infringing alternative.

Adam Roston v. Ask Media Group, IAC/Interactive Corp, Bluecrew and DOES 1 through 25. Before the Superior Court of the State of California for the County of Alameda. Case No. RG200649 80. Retained by counsel for plaintiff / counter-defendant re: damages from breach of contract and unlawful termination.

United Therapeutics Corporation v. Liquidia Technologies, Inc. Before United States District Court for the District of Delaware. Case No. 23-975 (RGA). Retained by counsel for defendants re: commercial success.

Liquidia Technologies, Inc. v. United States Food and Drug Administration et. al and United Therapeutics, Corp. Before United States District Court for the District of Columbia. Case No. 24-cv-2428-TJK. Retained by counsel for plaintiff / counter-defendant re: irreparable harm.

Credo Technology Group, Ltd. v. Credo.AI Corp. Before United States District Court for the Northern District of California. Case No. 5:24-cv-02032. Retained by counsel for plaintiff re: damages from trademark infringement.

Nicholas S. Hill, M.D.

CURRICULUM VITAE
NICHOLAS S. HILL, M.D.

Nicholas S. Hill, M.D.

Professor of Medicine

Tufts University School of Medicine

Immediate Past Chief, Pulmonary & Critical Care and Sleep Division

Pulmonary, Critical Care and Sleep Division

Tufts Medical Center

800 Washington St #257

Boston, MA 02111

Phone: 617-636-4288

Fax: 617-636-5953

Email: nhill@tuftsmedicalcenter.org**April 2025****EDUCATION**

Undergraduate 1971, A.B Harvard College

Medical School 1975, M.D Dartmouth Medical School

POSTGRADUATE TRAINING**Internship and Residencies:**

1975-1977 Medicine New England Medical Center | Tufts University School of Medicine

1977-1978 Internal Medicine Boston Veterans Admin. Medical Center

Fellowships

1978-1979 Cardiovasc. Med. University of Massachusetts Medical Center

1979-1982 Pulmonary Med. Boston University School of Medicine

LICENSURE AND CERTIFICATION

1977 #41058 Massachusetts

1987 #7167 Rhode Island

1975 Diplomate National Board of Medical Examiners

1978 Diplomate American Board of Internal Medicine

1983 Diplomate American Board of Internal Medicine, Pulmonary Disease

1987, renewed 2009 American Board of Internal Medicine, Special Qualification in Critical Care Medicine

ACADEMIC APPOINTMENTS

1982-1987 Assistant Professor of Medicine

Medicine Tufts University School of Medicine

1987-1994 Associate Professor of Medicine

Medicine Brown University

1994-2002 Professor of Medicine

Medicine Brown University

2002-2012 Adjunct Professor of Medicine

Medicine Brown Medical School Alpert

School of Medicine

2002-present Professor of Medicine Medicine Tufts University School of Medicine

HOSPITAL APPOINTMENTS

1982-1987 Assistant Physician

Medicine New England Medical Center

1987-2012 Associate Physician

Medicine University Medicine Foundation,

Rhode Island Hospital

1987-1996 Director, Resp. Care Unit

Medicine Rhode Island Hospital

1996-2000 Medical Director, Pulmonary Rehab Program

Medicine Meeting Street Center

1997-1998 Director, Medical ICU

Medicine Rhode Island Hospital

1998-2002 Director, Critical Care Service

Medicine Rhode Island Hospital

2000-2002 Chief, Pulmonary Division

Medicine Miriam Hospital

2003-2012 Medical Director, Outpatient Pulmonary Rehabilitation Program

Medicine New England Sinai Rehabilitation Center

2002-2023 Chief, Pulmonary, Critical Care & Sleep Division

Medicine Tufts Medical Center

2002-present Professor Pulmonary, Critical Care & Sleep Division

Medicine Tufts Medical Center

2013- Medical Staff

Medicine Lowell General Hospital

2017- Courtesy Medical Staff

Medicine UMass Memorial Medical Center

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

OTHER CLINICAL POSITIONS

Medical Director
Pulmonary Rehabilitation Program, Meeting Street Center, East Providence, RI, 1996-2000
Medical Director
Pulmonary Rehabilitation Program, Miriam Hospital, 2000-2002
Medical Director
VNA of Rhode Island, 1996-2002
Medical Director
Respiratory Care Tufts-New England Medical Center, 2002-present
Medical Director
Pulmonary Rehabilitation Program, New England Sinai Hospital, Stoughton, MA, 2003-2012
Physician
Pulmonary Hypertension Clinic, Rhode Island Hospital, 2002-2012
Consultant, Louise Wilcox Multidisciplinary ALS Clinic, Rhode Island Hospital, 2003-present
Physician
Pulmonary Hypertension Clinic, UMass Memorial Medical Center, 2017 -present

HONORS AND AWARDS

1973	Mosby Book Award, Dartmouth Medical School
1971	Phi Beta Kappa
1975	Alpha Omega Alpha
1984	Career Investigator Award, NIH
1984	Fellowship Award, Parker B. Francis Foundation
2002	Citizenship Award, City of Providence, RI
2002	Murray Kornfeld Honor Lecture, ACCP Annual Meeting
2003	Phil Kittredge Memorial Lecture, AARC Annual Meeting
2004	Eli Lilly Distinguished Scholar in Critical Care, Chest Foundation
2003-Present	Best Doctors in America
2005	Henry Chadwick Medal, Massachusetts Medical Society
2003-Present	Best Doctors in Boston, Boston Magazine
2007	Parker B. Francis Speaker, ATS International Conference
2009	Pulmonary Hypertension Association, Award for Excellence in PAH Care
2009	Margaret Pfrommer Memorial Lecture, ACCP Annual Meeting
2016	Distinguished Faculty Award, Tufts University School of Medicine
2018	Walter O'Donahue Memorial Lecture-NAMDRC Annual Meeting
2021	Leadership Award, Pulmonary Circulation Assembly, American Thoracic Society
2024	Career Achievement Award, Medical School, Dartmouth, NH

HOSPITAL COMMITTEES

- Internship Selection Committee
New England Medical Center Hospital, 1983-1987
- Internship Selection Committee
Rhode Island Hospital, 1987-2002
- Animal Welfare Committee
Rhode Island Hospital, 1990-2002
- Ethics Committee
Rhode Island Hospital, 1996-2002
- General Clinical Research Center
Tufts-New England Medical Center, 2002-2006
- Scientific Advisory Committee
Tufts Medical Center, 2002-2006
- Executive Committee, Department of Medicine

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

Tufts Medical Center, 2002-present

- CME Advisory Committee, 2015-present

OTHER MAJOR COMMITTEE ASSIGNMENTS

- Grant Review Committees/Study Sections : American Thoracic Society, Research Grant Review Committee, 1987-1990
- National Heart Lung & Blood Institute Lung Biology and Pathology Review Group, Aspen, CO. June 1991
- Program Project Grant Reviewer: October 1992
- Promotions Committee: Department of Medicine, 1995-2002
- Chair, Lung Biology and Pathology: Ad Hoc Review Group. 1996
- Chair, Research Committee, Dept. of Medicine : Brown Medical School, 1999-2002
- Strategic Planning Committee: Brown Medical School, 1999-2000
- Chair Elect: Medical Faculty Executive Committee. Brown Medical School, 1999-2000
- Research Advisory Committee: Academic Medical Center, 1999-2002
- Eastern Regional Cardiopulmonary Grant Review Committee:
American Heart Association. March, Co-Chair, 1998, Chair 1999, 2000
- Chair: Medical Faculty Executive Committee, 2000-2001
- Chair Emeritus: Medical Faculty Executive Committee, 2001-2002
- Ad Hoc Reviewer: Orphan Products Division, FDA/NIH, June, 2000, Dec 2002
- Site Visitor for Review of General Clinical Research Center: Boston University, Boston, MA. July, 2000.
- Member ARDSnet Review Committee: NIH. March 2005
- Member, Ad Hoc Review Group, Specialized Clinical Centers of Research, Pulmonary
Vascular Disease, NIH. March 2006
- Member, Ad Hoc Review Group, Centers for Multicenter Trial; Pulmonary Hypertension in
Sickle Cell Disease, NIH. April 2006
- Clinical Research Development Committee, Tufts Medical Center, 2007-Present
- Gilead PAH Scholar Research Program: Research Review Committee, 2008 –2018, Chair, 2014 - 2018t
- Chair, NHLBI Steering Committee : PVDomics Network 2014 - Present
- Ad Hoc Reviewer: NHLBI Review Panel on “Translational Programs in Lung Disease (PO1), Washington, DC. Nov 2015.
- Ad Hoc Reviewer: NHLBI Vascular Interventional/Innovations and Therapeutic Advances (VITA)
Program Review Committee. Bolger Center, Potomac, MD. Jan 2016
- Ad Hoc Reviewer: NHLBI Program Project Review Committee, January 2017
- Ad Hoc Reviewer: NHLBI Clinical Trials Review Committee, February 2017
- Ad Hoc Reviewer : NHLBI Program Project Review Committee, May 2017
- Ad Hoc Reviewer : NHLBI PPG Review Committee, May 2018

CONSENSUS CONFERENCES / GUIDELINE COMMITTEES

- American College of Chest Physicians Consensus Conference.
Mechanical Ventilation Beyond The Critical Care Unit. October, 1993
- Joint Consensus Group on Noninvasive Ventilation
American College of Chest Physicians and National Association of Medical Directors of Respiratory
Care Scientific Advisor
- International Consensus, Conference Noninvasive Positive Pressure Ventilation in Acute Respiratory Failure.
Paris, France. April. 2000.
- Roundtable on Mechanical Ventilation :
European Intensive Care and Emergency Medicine Society. Brussels, Belgium. March 2003.
- Jury Member, International Consensus Conference: On End-of-Life in the ICU. Brussels, Belgium. April 2003.
- Presenter, International Consensus Conference: On Weaning from Mechanical Ventilation, Budapest, Hungary. March 2005.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

- Summarizer Conference on Respiratory Complications of Neuromuscular Disease : American Respiratory Care Foundation. March, 2006
- Co-Chair, Task Force on Noninvasive Ventilation Guidelines: American Thoracic Society (ATS) & European Respiratory Society (ERS), 2012 - 2017

TRAINING OF STUDENTS/POST-DOCTORAL FELLOWS

Name	Title	Dates	Current Position
Postdoctoral Trainees			
Alec Martin-Achard MD	Role of Oxidants in Lung Injury	1983-84	Practice, Geneva, SW
Peter Jederlinic, MD	ACE Activity In Hypoxic Lungs	1984-85	Asst Prof of Med, Cooperstown, NY
Chester Mohr MD	NIV in Neuromuscular Disease	1985-86	Practice, Cape Cod Hospital
James Klinger MD	ANP in Hypoxic Pulmonary Hypertension	1988-92	Assoc Prof. Med, Brown University
Anibal Arjona PhD.	Growth Suppressive Effect of ANP	1991-94	Research Assoc, Boston Heart Fnd
Raymond Petit MD	Polycythemia and Pulmonary Hypertension	1991-92	Private Practice, Massachusetts
James Nakashima PhD	ANP Receptor Modulation in Endothelial Cells	1992-99	Asst. Prof. Med, Brown University
Thomas Meyer MD	NIV in Respiratory Failure	1993-94	Asst. Prof. Medicine, Jefferson Univ.
Naomi Kramer MD	NIV in Respiratory Failure	1994-95	Asst. Prof. Medicine, Brown Univ.
Richard Swift MD	CNP Responses during Hypoxia	1995-96	Private Practice, New Jersey
Sangeeta Mehta MD	Mechanisms of Noninvasive Ventilation	1995-97	Prof Medicine, Univ of Toronto
James McCormick MD	Masks for Noninvasive Ventilation	1997-98	Private Practice, Westerly, RI
Mallik Karemsetty PhD	Mechanisms of Pulmonary Vasoreactivity	1998-00	Asst. Prof of Med Brown University
John Ladetto MD	Angiogenesis in Pulmonary Hypertension	1999-00	Private practice, Pawtucket, RI
Ioana Preston MD	Phosphodiesterase Inhibitors In PHT	2000-01	Assoc. Prof of Med, TUSM
Tim Liesching MD	Noninvasive Ventilation for CHF	2001-02	University
Vinay Maheshwari MD	Utilization of NPPV in Acute Care	2003-05	Asst Prof of Med, Tufts University
Kate Steiner MD	Pulmonary Hypertension	2005-06	Asst Prof Med, Harvard Medical School
Aylin Ozsancek MD	Utilization of Noninvasive Ventilation	2005-08	Asst Prof of Med, Cenkan, Turkey
Ali Khodabendeh MD	Noninvasive Ventilation	2006-08	Private Practice
John Brennan MD	Pulmonary Hypertension Critical Care	2006-08	Private Practice
Samy Sidhom MD	Utilization of Noninvasive Ventilation	2008-09	Private Practice
Imrana Qawi MD	Sedation for Noninvasive Ventilation	2009-12	Asst Prof of Med, Tufts Medical Center
Archana Shah MD	Pulmonary Hypertension	2009-11	Staff, Kaiser Permanente, CA
Matthew Cohn MD	Effect of Breathe Ventilation System on Work of Breathing in COPD patients	2012-13	Asst Prof of Med, National Jewish Health, Denver, CO.
Viola Tracy MD	Effect of Breathe Ventilation System on Work of Breathing in COPD Patients	2012-13	Private Practice Minneapolis, MN
Nadine Al Naamani,MD	Phenotypes in Pulmonary Hypertension	2013-16	Asst. Prof of Med, University of Pennsylvania
Giulia Spoletini, MD	High Flow Nasal O ₂ During Breaks from NIV	2013-14	PhD Student, Leeds, UK.
Mona Alotaibi, MD	High Flow Nasal O ₂ During Breaks from NIV	2013-14	Pulm Critical Care Fellow, UCSD, CA.
Felix Yu, MD	Reliability of PAWP Measurements in PH	2014-16	Asst Prof of Med, Tufts Medical Center
Christopher Manley,MD	Vasoreactivity in Group 2 PH	2013-14	Research Fellow, Tufts Medical Center
Ana Carolina Garza,MD	Vasoreactivity in Group 2 PH	2013-14	Research Fellow, Tufts Medical Center
Haval Chweich, MD	Aerogen Nebulizer for Acute Asthma	2014-16	Asst. Prof of Med, Tufts Medical Center
Alia Khoja, MD	Physiologic Response to HFNO	2014	Resident, George Washington
Chiara Mega, MD	Physiologic Response to HFNO	2014	Pulmonologist, Bologna, Italy
Maureen Spring, MD	Physiologic Response to HFNO	2015-17	Asst. Prof of Med, Tufts Medical Center
Abdallah Kharnaf, MD	Use of Wedge Pullback Oximetry	2015-17	Private Practice
Alham Alonaizan, MD	Dyspnea in DNI Patients	2015-	Research Scholar, Tufts Medical Center
Lara Pisani, MD	Dyspnea in DNI Patients	2015	Researcher, Univ of Bologna, Italy
Najia Indrees, MD	Aerogen Nebulizer for Acute Asthma	2016	Medical Resident, Tufts Medical Center
Faisal Al Tamimi, MD	Balloon Pulmonary Angiography	2016-17	Research Scholar, Tufts Medical Center
Abd Abdelrahman MD	Wedge Catheter Pull Back	2017-18	Research Fellow, Tufts Medical Center

NICHOLAS S. HILL, M.D.**CURRICULUM VITAE 2025**

Mayanka Tickoo MD	Changing Use of Nasal High Flow	2017-18	Attending Physician, Pulmonary, Critical Care, Yale-New Haven Medical Center
Asma Tariq, MD	Effect of HFNC on Clearability of Sputum	2018-19	Attending Physician, Pulmonary Critical Care, Tufts Medical Center
Anas Ahmed, MD	Wedge Catheter Pull Back	2018-19	Attending Physician, Pulmonary Critical Care, Tufts Medical Center
Elizabeth Han MD	Effect of HFNC on Clearability of Sputum	2020-21	Medical Resident, Tufts Medical Center
Divya Menon MD	Characterization of Group 2 Pulmonary Hypertension	2020-21	Research Fellow, Tufts Medical Center
Student Trainees			
Gabriel Salameh	Pulmonary Vasoconstriction in Rats	1994-95	Medical Student, UMDMJ
James Watt	Endothelin in Hypoxic Vasoconstriction	1995-96	Unknown
David Sciacca	Pulmonary Hypoxic Vasoconstriction	1996-97	Medical Student, Tufts
Christopher Alia	Vasoconstrictor Responses	1996-98	Medical Student, NY Medical College
Grace Wang	Endothelin Receptors During Hypoxia	1997-98	Research Assistant, Brown University
Brian Kwong	Angiogenesis In Pulmonary Hypertension	2000-01	Medical Student Early ID Trainee
Kenyatta Lee	Northern Analysis of Brain Natriuretic Peptide	1995-96	Medical Student, Cornell University
Stacy Harrington	Histologic Analysis of Pulmonary Arteries	1997-98	Undergraduate Univ. of Delaware
Shanta Whitaker	MAP Kinases in Hypoxic Pulmonary HTN	2001	Graduate/Student, Microbiology

TEACHING RESPONSIBILITIES**University Teaching Roles**

Section Leader	Biomed 117	Mammalian Physiology	1991-1994
Co-director	Biomed 209	Topics in Respiratory Physiology	1987-1989
Co-director	Biomed 219	Topics in Environmental Physiology	1989-1994
Section Leader	Biomed 281	Second year Pulmonary Pathophysiology	1987-2002
Small Group Leader and Lecturer-Tufts University			
Lecturer in second year Pathophysiology			2002-
Small group Leader			2002-

Hospital Teaching Roles

Attending Physician, Medical Intensive Care Unit, Brown	1987-2002
Attending Physician, Pulmonary Consult Service, Brown	1987-2002
Attending Physician, Respiratory Care Unit, Brown	1987-2002
Attending Physician, Pulmonary Ward, Tufts Medical Center, Boston, MA.	2002-
Attending Physician, Medical Intensive Care Unit, Tufts Medical Center, Boston, MA,	2002-
Attending Physician, Pulmonary Consult Service, Tufts Medical Center, , Boston, MA	2002-
Attending Physician, ICU at Lowell General & Saints Memorial Hospitals, Lowell, MA.	2013-

PROFESSIONAL SOCIETIES

American College of Chest Physicians, Fellow 1982-
 American Thoracic Society, Member 1982-
 Massachusetts Thoracic Society, Councilor, 1982-1987
 American Federation for Clinical Research, Member, 1982-2004
 New England Chapter of American College of Chest Physicians 1984-
 American Association for the Advancement of Science, 1985-1995
 American Physiological Society, Member, 1985-2002
 Rhode Island Thoracic Society, Member 1987
 Pulmonary Hypertension Association, 2004-
 American College of Chest Physicians 2005
 Society of Critical Care Medicine, 2017 -
 European Respiratory Society 2016

OFFICE AND COMMITTEE ASSIGNMENTS IN PROFESSIONAL SOCIETIES

■ **American Thoracic Society**

Program Planning Committee, Assembly on Pulmonary Circulation, 1991-1993
Chair-elect, 1995 Chair, 1996. Member, 2006 - 2007
Member, Research Coordinating Committee, 1992 - 1995
Member, Planning Committee, 2000 - 2006
Chair, Nominating Committee, Pulmonary Circulation Assembly, 2002 - 2003
Member, Program Review Subcommittee, 2003 - 2004
Chair, Program Planning Committee, Critical Care Assembly, 2003 - 2006
Member, Nominating Committee, Critical Care Assembly, 2006 - 2007
Member, Steering Committee, Critical Care Assembly, 2006 - 2007
Secretary-Treasurer 2008-9, Vice President 2009-10, President Elect, 2010 - 2011
President 2011-12, Immediate Past President, 2012 - 2013.
Member ,Nominating Committee, 2013 - 2015
Member , International Lung Health Committee, 2013 - 2014
Member, Drug/Device Discovery and Development Committee, 2013 - 2017
Secretary-Treasurer, Board of Trustees, ATS Foundation, 2015-2020
Member, Awards Committee, 2015-17
Chair, Executive Director Search Committee 2017-2018
Board of Trustees, ATS Foundation 2010-2020
Member, Funds for The Future Committee, ATS 2020-2023

■ **American College of Chest Physicians**

Vice Chair, Home Care Network, 2001 - 2002
Chair, Home Care Network, 2002 - 2004
Steering Committee, Home Care Network, 2001-10
Member, Health Policy and Advocacy Committee, 2020- 2022

■ **Rhode Island Thoracic Society**

ATS National Chapter Representative, 1991 - 2000

■ **New England Chapter of American College of Chest Physicians**

• Vice President, 1994 - 1995 • President, 1995 - 1996

■ **Pulmonary Hypertension Association 2004**

Member, Scientific Leadership Committee, 2004 - 2012

MAJOR RESEARCH INTERESTS

■ **Pulmonary Vascular Biology**

My main focus has been on the regulation of pulmonary vascular tone using hypoxia as a model. I have devoted considerable attention to the role of natriuretic peptides in ameliorating hypoxic pulmonary vasoconstriction and remodeling, and more recent interests have been in the role of angiogenic factors in hypoxic pulmonary hypertension, the role of serotonin in modulating pulmonary vasoreactivity, retinoic acid and the pathogenesis of PH, and signal transduction pathways including lipoxygenases and endothelin. More recently we are looking at cell permeable peptides as possible physiologic and therapeutic tools.

■ **Clinical Pulmonary Hypertension**

I established a Pulmonary Hypertension Center at Rhode Island Hospital and Tufts Medical Center and get referrals from all over Southern New England. My group has participated in many multicenter trials to evaluate the role of both intravenous and subcutaneous prostacyclins and more recently oral endothelin antagonists and combination therapy. We have also published many studies on therapeutic approaches in various forms of pulmonary hypertension, and continue to be interested in contributing to advances in therapy and suggesting new possible therapeutic approaches.

■ **Noninvasive Ventilation**

A major interest in clinical research has been to evaluate ways of delivering and testing the efficacy of noninvasive ventilation; the provision of mechanical ventilatory assistance without requiring an invasive airway. My group has performed a number of controlled trials dealing with these issues, and continues to examine new applications, improved techniques, and ethical aspects of noninvasive ventilation. Our most recent thrust has been to explore ways of enhancing the utilization of noninvasive ventilation in critical care and to understand the effect of noninvasive ventilation on sleep in the ICU. We have also initiated studies on nasal high flow therapy, another noninvasive approach to providing respiratory assistance, examining physiologic effects in COPD patients as well as use during breaks from bi-level noninvasive ventilation.

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▪ High Flow Nasal Therapy

The delivery of heated, humidified, oxygenated gas via soft cannulas intranasally is a newer technique for oxygen delivery and ventilatory assistance. We are involved in studies to understand physiologic effects, appropriate indications, outcomes and epidemiology of use

RESEARCH SUPPORT

GRANT AWARD/ FUNDING AGENCY/Private Foundations/Industry Awards	\$ AMOUNT	YEAR(S)
• CLINICAL INVESTIGATOR AWARD, NHLBI Principal Investigator	• \$50,000	• 1983-1988
• GRANT-IN-AID AMERICAN THORACIC SOCIETY Principal Investigator	• \$17,500	• 1983-1985
• PARKER B. FRANCIS FOUNDATION FELLOWSHIP Principal Investigator	• \$25,000	• 1983-1987
• SHERMAN-WELCH FOUNDATION AWARD Massachusetts Thoracic Society Principal Investigator	• \$5,000	• 1983-1985
• TRAVENOL, INC Grant for Study of Negative Pressure Ventilation in COPD Co-Investigator	• \$25,000	• 1984-1986
• GRANT-IN-AID, RHODE ISLAND HEART ASSOCIATION Principal Investigator	• \$20,000	• 1988-1989
• RESPIRONICS, INC. Grant for Study of Nasal Ventilation in COPD Principal Investigator	• \$18,000	• 1988-1989
• GRANT-IN-AID, RHODE ISLAND HEART ASSOCIATION Principal Investigator	• \$20,000	• 1990-1991
• RESPIRONICS, INC. Grant for Study of Nasal Ventilation in Neuromuscular Disease Principal Investigator	• \$5,000	• 1990
• BURROUGHS-WELLCOME, INC. Multicenter Trial Of Prostacyclin Infusion in Primary Pulmonary Hypertension Principal Investigator	• \$20,000	• 1991-1994
• RESPIRONICS, INC Grant for Study of Nasal Ventilation Principal Investigator	• \$8,000	• 1992
• LIFECARE, INC. Grant for Study of Negative Pressure Ventilator Principal Investigator	• \$16,000	• 1993
• RHODE ISLAND HEART ASSOCIATION - GRANT-IN-AID, Principal Investigator	• \$25,000	• 1993-1995
• RESPIRONICS, INC. Comparison of Bipap vs CPAP In Management of Acute Pulmonary Edema Principal Investigator	• \$18,300	• 1994-1995
• PURITAN-BENNETT, INC Grant for Evaluation Of 335 Bi-level Positive Airway Pressure Ventilation Principal Investigator	• \$4,000	• 1995
• RESPIRONICS, INC Evaluation of Exhalation Valves for Bilevel Positive Airway Pressure Ventilation Principal Investigator	• \$14,000	• 1995-1996
• MILES LABORATORY Phase III Trial of Norasept (Anti-TNF Antibody) for the Therapy of Sepsis. Principal Investigator	• \$20,000	• 1996-1997
• RESPIRONICS, INC Evaluation of Oronasal vs Nasal Masks for Administration of Noninvasive Ventilation Principal Investigator	• \$5,000	• 1996-1997

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• GLAXO-WELLCOME, INC. Randomized Trial of Intravenous Flolan for Patients with PH due to Scleroderma	• \$20,000/pt.	• 1997-1998
• RESPIRONICS, INC. Evaluation of the Vision Proportional Assist Ventilator Principal Investigator	• \$62,500	• 1997-1998
• RHODE ISLAND HEART ASSOCIATION - GRANT-IN-AID, Modulation of Pulmonary Hypertension by Natriuretic Peptides Principal Investigator	• \$30,000	• 1997-1999
• RESMED, INC. Randomized Trial of Noninvasive Ventilation to Facilitate Extubation of Patients with Respiratory Failure	• \$40,000	• 1998-1999
• UNITED THERAPEUTICS INC. Randomized Trial of Subcutaneous UT-15 to Treat Patients with Severe Pulmonary Hypertension	• \$15,000/pt.	• 1998-1999
• RESMED, INC. Randomized Trial of NPPV after Hypercapnic Respiratory Failure in COPD. Principal Investigator	• \$40,000	• 2000-
• SUNTORY, INC. Phase II Multicenter Trial of Alpha-hANP Infusion in ARDS. Principal Investigator	• \$45,000	• 2000-
• ICOS PHARMACEUTICALS/TEXAS BIOCHEMICAL Randomized Controlled Trial of Sitaxsentan in the Therapy of Severe PH	• \$20,000/pt.	• 2001-2002
• RESPIRONICS, INC. Trial of the Total Face Mask for Noninvasive Ventilation	• \$10,000	• 2002-2003
• PFIZER, INC. Randomized Trial of the Phosphodiesterase Inhibitor, Sildenafil in PAH	• \$17,000/pt.	• 2003
• ACTELION, INC. Transition from Prostacyclin Infusion to Oral Bosentan (Investigator Initiated)	• \$35,000/yr.	• 2003-2005
• MYOGEN, INC. Randomized Trial of Ambrisentan to Treat Patients with Pulmonary Arterial Hypertension	• \$15,000/pt.	• 2003-2005
• PFIZER, INC. Randomized Trial of the Phosphodiesterase Inhibitor, Sildenafil, Added to Intravenous Epoprostenol in Patients with Pulmonary Arterial Hypertension.	• \$17,000/pt.	• 2003-2005
• UNITED THERAPEUTICS, INC. Transition from IV Epoprostenol to Sc Treprostinil (Investigator Initiated)	• \$40,000	• 2003-2005
• ELI LILLY. Distinguished Scholar in Critical Care Medicine Chest Foundation, Enhancing the Utilization of Noninvasive Positive Pressure Ventilation.	• \$50,000/yr.	• 2003-2006
• ENCYSIVE, INC. Open-Label Trial of Sitaxsentan In The Therapy Of Severe Pulmonary Hypertension.	• \$17,000/pt.	• 2004-2006
• RESMED, INC. Investigation of Inspiratory Time Limits for Enhancing Patient-Ventilator Synchrony During Noninvasive Ventilation	• \$40,000	• 2004-2005
• UNITED THERAPEUTICS, INC. Trial Of Ropivacaine, A Local Anesthetic, In Controlling Site Pain during Sc Treprostinil Infusion.	• 2,000 /pt.	• 2005
• SUNOL, INC.SAFETY Pharmacokinetics and Physiological Effects Of Ch36 In Patients with Acute Lung Injury	• 8000/pt.	• 2005
• ASTRA-ZENCA, INC. Efficacy and Safety of Quetiapine in Medical Intensive Care Unit Patients with Delirium: a Randomized Study	• \$5,000/pt.	• 2005-2006
• ICOS PHARMACEUTICALS, INC. Randomized, Controlled Trial of Tadalafil to Treat Pulmonary Arterial Hypertension.	• \$8,000/pt.	• 2005-2006
• RESPIRONICS, INC. Enhancement of the Utilization of Noninvasive Positive Pressure Ventilation Multicenter Trial.	• \$333,000/yr.	• 2005-2008

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• COTHERIX, INC. Addition of Inhaled Iloprost to Sildenafil In Pulmonary Arterial Hypertension Multicenter Trial	• \$8,000/pt.	• 2006-2007
• ACTELION, INC. Addition of Bosentan to Sildenafil In Pulmonary Arterial Hypertension, Multicenter Trial	• \$8,000/pt.	• 2006-2007
• UNITED THERAPEUTICS, INC. Evaluation of Oral Treprostinil In Pulmonary Arterial Hypertension Multicenter Trial	• \$8,000/pt.	• 2006-2007
• LUNG RX, INC. Addition of inhaled Treprostinil to Sildenafil or Bosentan In Pulmonary Arterial Hypertension Multicenter Trial.	• \$8,000/pt.	• 2006-2007
• EPIX PHARMACEUTICALS Effect of Serotonin B2 Receptor Blockade On Pulmonary Hypertension in COPD.	• \$8,000/pt.	• 2006-2007
• GILEAD SCIENCES, INC Ambrisentan to Treat Patients with WHO Groups 1,3 and 4 PAH ARIES 3.	• \$8,000/pt.	• 2006-2007
• UNITED THERAPEUTICS Long-term effects of inhaled treprostinil	• \$10,000/pt.	• 2007-2008
• RESPIRONICS GRANT Utilization of Noninvasive Ventilation in Acute Care. The major goal of this multicenter project is to evaluate the utilization of noninvasive ventilation in acute respiratory care in different hospitals.	•	• 2007-2013
• ACTELION, INC. Study to assess the safety and tolerability of ACT-064992 in patients with symptomatic PAH.	• \$10,000/pt.	• 2008-2009
• UNITED THERAPEUTICS Evaluation of oral treprostinil effect on exercise capacity	• \$6,000/pt.	• 2008-2010
• UNITED THERAPEUTICS A post-marketing observational study to assess respiratory tract adverse events in pulmonary arterial hypertension patients treated with Tyvaso (treprostinil) inhalation solution	• \$4,000/pt.	• 2008-2010
• ACTELION, INC. (REVEAL) Registry of pulmonary hypertension patients	• \$3,000/pt.	• 2008-
• UNITED THERAPEUTICS An open-label extension trial of UT-15C SR in subjects with Pulmonary Arterial Hypertension	• \$4,000/pt.	• 2009-2010
• BAYER Randomized controlled trial to evaluate efficacy and safety of oral BAY 63-2521 in patients with PAH (2 studies – blinded and extension)	• \$8,000/pt.	• 2009-2012
• HOSPIRA Use of dexmetatomidine as sedative agent during non-invasive ventilation	• \$3,000/pt.	• 2009-
• GILEAD SCIENCES, INC Randomized controlled study of Cicletanine in subjects with Pulmonary Arterial Hypertension	• \$8,000/pt.	• 2009-2012
• GILEAD SCIENCES, INC. (AMBITION) Assesses the effect of an upfront combination of Tadalafil and Ambrisentan compared to each drug alone in patients with pulmonary arterial.	• \$14,000/pt.	• 2010-2014
• GeNO LLC Evaluates new way to deliver inhaled nitric oxide and assesses response in patients with pulmonary hypertension	• \$3,000/pt.	• 2010
• RESPIRONICS High intensity non-invasive positive pressure ventilation (NPPV) for stable hypercapnic COPD patients	• \$3,000/pt.	• 2010-2011
• UNITED THERAPEUTICS, INC. A post-marketing observational study to assess respiratory tract adverse events in pulmonary arterial hypertension patients treated with Tyvaso (treprostinil) inhalation solution.	• \$3,000/pt.	• 2010-2014
• PHAROS Examines natural history of scleroderma in registry centered at Georgetown Medical Center	• \$2,000/pt.	• 2010-2015
• ACTELION, INC. Long-term effect of combination therapy with bosentan and sildenafil (Compass II)	• \$10,000/pt.	• 2010-2016
• CHEST FOUNDATION-RESPIRONICS Enhancing utilization of non-invasive ventilation in critical care	• 1,000,000	• 2010-2016
• ACTELION, INC.	• \$14,000/pt.	• 2010-2016

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Study to assess the safety and tolerability of ACT-064992 in patients with symptomatic PAH.		
• GENZYME PHARMACEUTICALS Evaluation of neutral endopeptidase inhibitor + nitric oxide in rates with pulmonary hypertension induced by monocrotalins	• \$40,000/pt.	• 2011-2015
• BREATHE TECHNOLOGIES, INC. Effect of Noninvasive Open Ventilation (NICU) on Work of Breathing in COPD patients.	• \$60,000	• 2012-2013
• FISHER PAYKEL HEALTH INC. Role of high flow nasal O ₂ during breaks from NIV	• \$120,000	• 2013-2014
• FISHER PAYKEL HEALTH INC. Physiologic Effects of High Flow Nasal H2O in COPD	• \$60,000	• 2014-2016
• GILEAD SCIENCES, INC. A Phase 2 randomized, double-blind, placebo-controlled multi-center study to assess the efficacy and safety of GS-6624 (Sintuzumab) in subjects with idiopathic pulmonary fibrosis	• \$10,000/pt.	• 2014-2016
• UNITED THERAPEUTICS, INC. A phase III, international, multi-center, randomized, double-blind, placebo-controlled, clinical worsening study of UT-15C in subjects with pulmonary arterial hypertension receiving background oral monotherapy	• \$14,000/pt.	• 2014-2018
• ACTELION, INC. (SERAPHIN) Study to assess the safety and tolerability of ACT-064992 in patients with symptomatic pulmonary arterial hypertension (blinded and open label)	• \$14,000/pt.	• 2014-2017
• REATA PHARMACEUTICALS A dose-ranging study of the efficacy and safety of bardoxolone methyl in patients with PAH.	• \$8,000/pt.	• 2014-2020
• AERODYNE, INC Aerogen Nebulizer For Treatment Of Acute Asthma	• \$ 40,000	• 2015
• ACTELION, INC. Phase 3b study of macitentan in patients with pulmonary arterial hypertension to psychometrically validate the PAH-SYMPACT instrument.	• \$8,000/pt.	• 2015-2019
• UNITED THERAPEUTICS INC. A multicenter, randomized, double-blinded, placebo-controlled trial to evaluate the safety and efficacy of inhaled Treprostinil in subjects with pulmonary hypertension due to parenchymal lung disease.	• \$8,000/pt.	• 2016-
• REATA PHARMACEUTICALS, INC. An Extended Access Program to Assess Long-Term Safety of Bardoxolone Methyl in Patients With Pulmonary Hypertension	• 12,000pt	• 2016-2020
ALUNG TECHNOLOGIES, INC. A Prospective, Multi-Center, Randomized, Controlled, Pivotal Trial to Validate the Safety and Efficacy of the Hemolung® Respiratory Assist System for COPD Patients Experiencing an Acute Exacerbation Requiring Ventilatory Support.	• \$26,000/pt	• 2017-
• AEROGEN PHARMA LIMITED A Two-Part Pharmacodynamic Study to Compare VentaProst™ (Epoprostenol Solution for Inhalation via Custom Drug Delivery System) Dosing to Conventionally Administer Aerosolized Epoprostenol Dosing in Cardiac Surgery Patients.	• \$5,000/pt	• 2017-2019
• ACTELION PHARMACEUTICALS LTD. A multi-center, double-blind, placebo-controlled, Phase 4 study in patients with pulmonary arterial hypertension to assess the effect of selexipag on daily life physical activity and patient's self-reported symptoms and their impacts	• \$22,000/pt	• 2017-2019
• UNITED THERAPEUTICS CORP. A Multicenter, Randomized, Double-Blinded, Placebo-Controlled Trial to Evaluate the Safety and Efficacy of Inhaled Treprostinil in Subjects with Pulmonary Hypertension due to Parenchymal Lung Disease. INCREASE trial	• \$22,000/pt	• 2018-2020
• PROVIDENCE ST. JOSEPH'S & ST. MICHAEL'S HEALTHCARE The Frequency of Screening and SBT Technique Trial: The FAST Trial - A North American Weaning Collaboration. FAST-002 Co-Principal Investigator Principal Investigator Karen Burns, MD, FRCPC	• 12,531	• 07/12/2018
• LIQUIDIA LTI-301	• \$\$10,816	• 08/05/2018

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A phase 3 open-label, multicenter study to evaluate the Long-term Safety and Tolerability of Inhaled LIQ861 (treprostinil) in Pulmonary Arterial Hypertension (WHO Group 1) Patients (INTREPID) Co-Investigator (PI: Ioana Preston, MD)		
• LIQUIDIA LTI-302 A Global, Open-Label, Extension Study for Participants in LIQ861 Trials to Evaluate the Long-term Safety of Inhaled LIQ861(Treprostinil) in Pulmonary Arterial Hypertension (WHO Group 1) Patients. Co-Investigator (PI: Ioana Preston, MD)	• \$6,551	• 9/19/2019
• GOSSAMER BIO. A Phase 1b, Randomized, Subject-and Investigator-Blinded, Placebo-Controlled, Multi-Center Clinical Trial to Evaluate the Safety, Pharmacokinetics, Pharmacodynamics, and Biomarkers of Inhaled GB002 in Subjects with WHO Group 1 Pulmonary Arterial Hypertension (PAH) Principal Investigator	• \$9,000/pt	• 2019-2020
• INSPIRE MEDICAL SYSTEMS Adherence and Outcome of Upper Airway Stimulation (UAS) for OSA International Registry: ADHERE UAS Registry Co-Investigator (PI: Khalid Ismail, MD)	• \$769	• 11/01/2019
• FISHER & PAYKEL Effect of high flow nasal cannula on sputum clearance in acute exacerbation of chronic obstructive pulmonary disease, a prospective study Principal Investigator	• \$11,923xxx	• 06/10/2020
• DUKE/DCR I , ACTIV-1 Randomized Blinded Controlled Trial of the Safety and Efficacy of Multiple Therapeutics for the Treatment of COVID-19 in Hospitalized Adults (ACTIV-1) Principal Investigator	• \$18,886	• 08/17/2020
• ALTAVANT , RVT-1201-2002 A Phase 2b, Dose-Ranging, Radmonized, Double-Blind, Placebo-Controlled, Multicenter Study of Rodatristat Ethyl in Patients With Pulmonary Arterial Hypertension Principal Investigator	• \$1,635	• 02/21/2021
• UNITED THERAPEUTICS, RIN-PF-301 STUDY (TETON) A Randomized, Double-blind, Placebo-controlled, Phase 3 Study of the Efficacy and Safety of Inhaled Treprostinil in Subjects with Idiopathic Pulmonary Fibrosis Principal Investigator	• \$5,562	• 2021
• NYU LANGONE / AWARE II Exploring Human Mind, Brain and Consciousness During Death: A Combined Prospective and Retrospective Study -- Aware II Co-Investigator (PI: Michael McBrine MD)	• \$0	• 05/25/2021
• RESPIRA THERAPEUTICS INC (STUDY00002913) A Phase 2, Open-label, Dose-escalation Study to Evaluate the Safety and Efficacy of RT234 on Exercise Parameters Assessed by Cardiopulmonary Exercise Testing (CPET) in Subjects with Pulmonary Arterial Hypertension (PAH) Principal Investigator	•	• 10/2023
• SEDANA MEDICAL STUDY00002425 INSPiRE-ICU Study - A Phase 3 Study of Inhaled Isoflurane Delievered via the Sedaconda ACD-S Principal Investigator	•	• 04/2024
• UNITED THERAPEUTICS An Open-label Extension Study of Inhaled Treprostinil in Subjects with Idiopathic Pulmonary Fibrosis Principal Investigator	•	• 04/20204
• DAEWONG PHARMACEUTICAL CO., LTD A Phase 2, Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Safety and Efficacy of DWN12088 in Patients With Idiopathic Pulmonary Fibrosis Principal Investigator	•	• 05/2024

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• GOSSAMER BIO SERVICES, INC. A Phase 3, Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Efficacy and Safety of Oral Inhalation of Seralutinib for the Treatment of Pulmonary Arterial Hypertension (PAH) Principal Investigator	•	• 06/2024
• GOSSAMER BIO, STUDY00004353 A Phase 3, Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Efficacy and Safety of Oral Inhalation of Seralutinib for the Treatment of Pulmonary Arterial Hypertension (PAH) Principal Investigator	•	• 06/2024
• UNITED THERAPEUTICS A Randomized, Double-blind, Placebo-controlled, Multinational, Phase 3 Study of the Efficacy and Safety of Inhaled Treprostinil in Subjects with Progressive Pulmonary Fibrosis (TETON-PPF) Principal Investigator	•	• 07/2024
• INSMED INC. A Phase 2b, Randomized, Double-Blind, Multicenter, Placebo-Controlled Study to Evaluate the Efficacy, Safety, and Pharmacokinetics of Treprostinil Palmitil Inhalation Powder in Participants with Pulmonary Arterial Hypertension Principal Investigator	•	• Pending
• INSMED INC An Open-Label Extension Study to Assess the Safety, Tolerability, and Effectiveness of the Long-Term use of Treprostinil Palmitil Inhalation Powder in Participants with Pulmonary Arterial Hypertension Principal Investigator	•	• Pending
• UNIVERSITY OF COLORADO, DENVER (AARF) Aspiration in Acute Respiratory Failure Survivors NIH Site Principal Investigator Principal Investigator: Marc Moss, MD	•	• 2021-2024
• AEROVATE THERAPEUTICS, INC. IMPAHCT: A Phase 2b/3, Randomized, Double-Blind, Placebo-Controlled, 24-Week Dose Ranging and Confirmatory Study to Evaluate the Safety and Efficacy of AV-101 in Patients with Pulmonary Arterial Hypertension (PAH) Site Principal Investigator & Steer Committee Chair	•	• 2022-2024
• GB002, INC. A Phase 2, Randomized, Double-Blind, Placebo-Controlled, Multi-Center Clinical Study to Evaluate the Efficacy and Safety of Oral Inhalation of GB002 for the Treatment of WHO Group 1 Pulmonary Arterial Hypertension(PAH) Site Principal Investigator	•	• 2022/2023
• TEMPLE UNIVERSITY & FISHER AND PAYKEL HEALTHCARE My Airvo 3 (High Flow Nasal Therapy; HFNT) for COPD Patients in the Home - a Multi-center Randomized Controlled Trial Site Principal Investigator Gerard Criner, MD	•	• 2022-2025
• LIBERATE MEDICAL Supported – US Department of Defense, Prevent: Pivotal Evaluation of Abdominal Neuromuscular Electrical Stimulation (VentFree) for Weaning from Mechanical Ventilation Site /Principal Investigator	•	• 06/2024

NIH Awards			
• NHLBI - RO1 AWARD "Atrial Natriuretic Peptide and the Lung"	Principal Investigator	• \$220,000/yr.	• 1991-2001
• NIH/NHLBI – RO1 AWARD Endothelin and Angiotensin Receptor Signaling in Pulmonary Hypertension	Co-Investigator, (PI: Peter Polgar PhD)	• \$80,000/yr.	• 2008-2013
• NIH/NHLBI Implementation and Outcomes of Noninvasive Ventilation in COPD	Co-Investigator, (PI: Peter Lindenauer PhD)	• \$14,000/yr.	• 2011-2016
• NIH/NHLBI	Collaborator, PI: Deniz Toksoz, PhD	•	• 2012-2014

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Targeted Rho kinase-1 KO Mouse Model for Vascular Smooth Muscle Remodeling		
• NIH/NHLBI Smooth Muscle Cell Protein Serotonylation and Pulmonary Hypertension	Collaborator,(PI: Barry Fanburg, MD)	• 2012-2016
• NIH/NHLBI National Biological Sample and Data Repository for Pulmonary Arterial Hypertension	Co-Investigator, (PI: Bill Nichols, PhD)	• \$62,500 • 2013-2017
• NIH/NHLBI Chair, Steering Committee PVDomics Network		• 10% Salary Support • 2014-
• NIH/NHLBI - PETAL NETWORK Re-examination of neuromuscular blockade to treat early ARDS. Low tidal volume universal support: feasibility of recruitment for interventional trial acronym: LOTUS FRUIT	Site PI, (Local Site PI: Jay Steingrub MD)	• \$6,000/pt. • 2016-2018

EDITORIAL BOARDS AND ACTIVITY

- **Editorial Boards:**
 - American Journal of Respiratory and Critical Care Medicine 1994-2000, 2002-2008
 - Ibero American Journal of Noninvasive Mechanical Ventilation 2003-
 - Chronic Respiratory Disease, Arnold Publishers, London. 2003-
 - Breathe, education Journal of European Respiratory Society, 2006-2016
 - Expert Reviews in Respiratory Medicine 2007-
 - Respiratory Care 2008
 - European Medical Journal-Respiratory 2012-
- **Associate Editor, Chest 2005-2019**
- **Reviewer for the following journals:**
 - American Journal of Epidemiology
 - American Journal of Physiology: Lung cellular and molecular physiology
 - American Journal of Respiratory and Critical Care Medicine
 - Annals of internal Medicine
 - Chest
 - Circulation Research
 - Critical Care Medicine
 - European Respiratory Journal
 - General Internal Medicine
 - Intensive Care Medicine
 - International Journal of COPD
 - International Journal of Sports Medicine
 - Journal of Applied Physiology
 - Journal of Clinical Investigation
 - Lung
 - Medicine and Science in Sports and Medicine
 - Muscle & Nerve
 - New England Journal of Medicine
 - Respiratory Care
 - Respiratory Medicine
 - Thorax

BIBLIOGRAPHY: Original/Peer Reviewed Articles

1. Bouverot P, **Hill NS**, Jammes Y. Ventilatory responses to CO₂ in intact and chronically chemodenervated Peking Ducks. *Respir Physiol* 1974, 22:137-156.
2. **Hill NS**, Tenney SM. Ventilatory responses to CO₂ and hypoxia in the two-toed sloth (*Choloepus hoffmanni*). *Respir Physiol* 1974, 22:322-332.
3. **Hill NS**, Antmann E, Green L, Alpert JS. Intravenous nitroglycerin: A review of pharmacology, indications, therapeutic effects, and complications. *Chest* 1981 79:69-76.
4. **Hill NS**, Rounds S. Amrinone dilates pulmonary vessels and blunts hypoxic vasoconstriction in isolated rat lungs. *Proc Soc Exp Biol Med* 1983, 173:205-212.

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5. **Hill NS**, Rounds S. Vascular reactivity is increased in rat lungs injured with a-naphthyl-thiourea. *J Appl Physiol: Respir Environ Exercise Physiol* 54:1693-1701, 1983.
6. Rounds S, **Hill NS**. Pulmonary hypertensive diseases. *Chest* 1984 85:397-405.,
7. **Hill NS**, O'Brien RF, Rounds S. Repeated lung injury due to a-naphthylthiourea causes right ventricular hypertrophy in rats. *J Appl Physiol: Respir Environ Exercise Physiol* 1984, 56:388-396.
8. Brody JS, Vaccaro CA, **Hill NS**, Rounds S. Binding of charged ferritin to alveolar wall components and charge selectivity of macromolecular transport in permeability pulmonary edema in rats. *Circ Res* 1984,55:155-167.
9. Ou LC, **Hill NS**, Tenney SM. Ventilatory responses and blood gases in susceptible and resistant rats to high altitude. *Respir Physiol* 1984, 58:161-170.
10. **Hill NS**, Ou LC. The role of pulmonary vascular responses to chronic hypoxia in the development of chronic mountain sickness in rats. *Respir Physiol* 1984, 58:171-85.
11. Rounds S, Farber HW, **Hill NS**, O'Brien RF. Effects of endothelial cell injury on pulmonary vascular reactivity. *Chest* 1985, 88:213S-216S.
12. Ou LC, Sardella GL, **Hill NS**, Tenney SM. Acute and chronic pulmonary pressor responses to hypoxia: the role of blunting in acclimatization. *Respir Physiol* 1986, 64:81-91.
13. **Hill NS**. Fluid and electrolyte considerations in diuretic therapy of hypertensive patients with chronic obstructive pulmonary disease. In: *Arch Intern Med* 1986, 146:129-133.
14. **Hill NS**. Clinical applications of body ventilators. *Chest* 1986, 90:897-905.
15. Farber HW, Arbetter J, Schaefer EJ, Hill SP, Grimaldi R, Dallal G, **Hill NS**. Acute metabolic effects of an endurance triathlon. *Ann Sports Med* 1987, 3:131-138.
16. Konstam MA, **Hill NS**, Bonin JD, Isner JM. Prostaglandin medication of hemodynamic responses to pulmonary microembolism in rabbits: effect of ibuprofen and meclofenamate. *Exp Lung Res* 1987, 12:331-345.
17. **Hill NS**, Smith RP, Ou LC. Time course of the development of cardiopulmonary responses to chronic hypoxia in two strains of rat with differing susceptibilities to high altitude. *Respir Physiol* 1987, 70:229-240.
18. **Hill NS**, Sardella GL, Ou LC. Reticulocytosis, increased mean red cell volume, and greater blood viscosity in altitude susceptible compared to altitude resistant rats. *Respir Physiol* 70:241-249, 1987.
19. Langleben D, Jones RC, Aronovitz MJ, **Hill NS**, Ou LC, Reid LM. Pulmonary artery changes in two colonies of rats with differing sensitivity to chronic hypoxia. *Am J Pathol* 128:61-66, 1987.
20. **Hill NS**, Ou LC. The possible role of atrial natriuretic factor in modulating the pulmonary hypertensive response to hypoxia. *Chest* 1988, 93:955-965.
21. **Hill NS**. Home care of ventilator assisted and dependent patients. *J Cardiopulm Rehab* 1988, 8:462-472.
22. Jederlinic P, **Hill NS**, Ou LC, Fanburg BL. Angiotensin converting enzyme in chronically hypoxic rats. *Thorax* 43(9):703-707, 1988.
23. Zibrak JD, **Hill NS**, Federman E, Kwa SL, O'Donnell C. Evaluation of intermittent long-term negative pressure ventilation in patients with severe chronic obstructive pulmonary disease. *Am Rev Respir Dis* 1988, 138:1515-1518.
24. **Hill NS**. The use of theophylline in "irreversible" chronic obstructive pulmonary disease: An update. *Arch Int Med* 1988, 148:2579-2584.
25. **Hill NS**, Jederlinic P, Gagnon J. Supplemental oxygen reduces right ventricular hypertrophy in monocrotaline-injected rats. *J Appl Physiol* 1989, 66:1642-1648.
26. Ou LC, Sardella GL, **Hill NS**, Thron CD. Does atrial natriuretic factor protect against right ventricular overload. I. Hemodynamic study. *J Appl Physiol* 1989, 67:1606-1611.
27. Ou LC, Yen S, Sardella GL, **Hill NS**. Does atrial natriuretic factor protect against right ventricular overload. II. Tissue binding study. *J Appl Physiol* 1989, 67:1612-1616.
28. Lamont-Fava S, McNamara JR, Farber HW, **Hill NS**, Schaefer EJ. Acute changes in lipid, lipoprotein, apolipoprotein and low-density lipoprotein particle size after an endurance triathlon. *Metabolism* 1989, 38:921-925.
29. Konstam MA, Brockway B, Aronovitz MJ, Ramberg K, Palabrica TM, Otradovec CL, Cooper A, **Hill NS**. Kinetics of pulmonary platelet deposition and clearance during thrombin-induced microembolism in rabbits. *Exp Lung Res* 1989, 15:867-879.
30. Mohr CH, **Hill NS**. Long-term follow-up of nocturnal ventilatory assistance in patients with respiratory failure due to Duchenne-type muscular dystrophy. *Chest* 1990, 97:91-96.
31. **Hill NS**, Lee SL, Fanburg BL. Effect of calcium channel blockers on serotonin uptake (43043). *Proc Soc Exp Biol Med* 1990, 193:326-330.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

32. Strumpf DA, Millman RP, **Hill NS**. The management of chronic hypoventilation. *Chest* 1990, 94:474-480.

33. Strumpf DA, Carlisle CC, Millman RP, Smith KW, **Hill NS**. An evaluation of the Respiromics BiPAP Bi-level CPAP device for delivery of assisted ventilation. *Resp Care* 1990, 35:415-422.

34. **Hill NS**, Lee SL, Jederlinic P, Fanburg BL. Effect of chronic in vivo exposure to hypoxia on serotonin uptake by isolated rat lungs. *Gen Pharmacol* 1990, 21:943-947.

35. Strumpf DA, Millman RP, Carlisle CC, Grattan LM, Ryan SM, Erickson AD, **Hill NS**. Nocturnal positive pressure ventilation via nasal mask in patients with severe chronic obstructive pulmonary disease. *Am Rev Respir Dis* 1991, 144:1234-1239.

36. **Hill NS**, Jacoby C, Farber HW. Effect of an endurance triathlon on pulmonary function. *Med Sci Sports Exer* 1991, 23:1260-1264.

37. Klinger JR, **Hill NS**. Evaluation and management of right ventricular dysfunction in chronic obstructive pulmonary disease. *Chest* 1991, 99:715-723.

38. Farber HW, Schaefer EJ, Franey R, Grimaldi R, **Hill NS**. The endurance triathlon: metabolic changes after each event and during recovery. *Med Sci Sports Exer* 1991, 23:959-965.

39. **Hill NS**, Eveloff SE, Carlisle CC, Goff SG. Efficacy of nocturnal nasal ventilation in patients with restrictive thoracic disease. *Am Rev Respir Dis* 1992, 145:365-371.

40. **Hill NS**, Redline S, Carskadon MA, Curran FJ, Millman RP. Sleep-disordered breathing in patients with Duchenne muscular dystrophy using negative pressure ventilators. *Chest* 1992, 102:1656-1662.

41. Klinger JR, Moalli R, Warburton RR, Wrenn DS, **Hill NS**. C-receptor ligand blocks pulmonary clearance of atrial natriuretic peptide in isolated rat lungs. *Proc Soc Exp Biol Med* 1992, 201:154-158.

42. Petit RD, Warburton RR, Ou LC, Brinck-Johnson T, **Hill NS**. Exogenous erythropoietin fails to augment hypoxic pulmonary hypertension in rats. *Respir Physiol* 1993, 91:261-270.

43. **Hill NS**, Petit RD, Gagnon J, Warburton RR, Ou LC. Hematologic responses and the early development of hypoxic pulmonary hypertension in rats. *Respir Physiol* 1993, 91:271-282.

44. Ou LC, Juan JC, **Hill NS**. Possible role of pulmonary blood volume in chronic hypoxic pulmonary hypertension. *J Appl Physiol* 1993, 74:3020-3026.

45. Klinger JR, Petit RD, Curtin LA, Warburton RR, Wrenn DS, Steinhelper ME, Field LJ, **Hill NS**. Cardiopulmonary responses to chronic hypoxia in transgenic mice that overexpress atrial natriuretic peptide. *J Appl Physiol* 1993, 75:198-205.

46. Klinger JR, Petit RD, Warburton RR, Wrenn DS, Arnal F, **Hill NS**. Neutral endopeptidase inhibition attenuates the development of hypoxic pulmonary hypertension in rats. *J Appl Physiol* 1993, 75:1615-1623.

47. Meyer TJ, Eveloff, SE, Bauer MS, Schwartz WA, **Hill NS**, Millman RP. Adverse environmental conditions in the respiratory and medical intensive care unit settings. *Chest* 1994, 105:1211-1216.

48. **Hill NS**, Klinger JR, Warburton RR, Pietras L, Wrenn DS. Brain natriuretic peptide: possible role in the modulation of hypoxic pulmonary hypertension. *Am J Physiol* 1994, 266 (Lung Cell Mol Physiol 10): L308-L315,

49. **Hill NS**. Use of negative pressure ventilation, rocking beds and pneumobelts: *Respir Care* 1994, 39:532-549.

50. Klinger JR, Arnal F, Warburton RR, Ou LC, and **Hill NS**. Down-regulation of pulmonary atrial natriuretic peptide receptors in rats exposed to chronic hypoxia. *J Appl Physiol* 1994, 77:1309-1316.

51. Meyer TJ, **Hill NS**. Noninvasive positive pressure ventilation, advance in the treatment of respiratory failure. *Ann Intern Med* 1994, 120:760-770.

52. Petit RD, Warburton RR, Ou LC, **Hill NS**. Pulmonary vascular adaptation to augmented polycythemia during chronic hypoxia. *J Appl Physiol* 1995, 79:229-235,

53. Kramer N, Meyer TJ, Meharg J, Cece RD, **Hill NS**. Randomized, prospective trial of noninvasive positive pressure ventilation in acute respiratory failure. *Am J Respir Crit Care Med* 1995, 151:1799-1806.

54. Aaron JN, Carlisle CC, Carskadon MA, Meyer TJ, **Hill NS**, Millman RP. Environmental noise is a cause of sleep disruption in a respiratory intensive care unit. *Sleep* 1996, 19:701-710.

55. Arjona AA, Hsu CA, Wrenn DS, **Hill NS**. Effects of natriuretic peptides on vascular smooth muscle cells derived from different vascular beds. *Gen Pharm* 1997, 28: 382-392.

56. **Hill NS**, Mehta S, Carlisle CC, McCool FD. Evaluation of the Puritan-Bennett 335 portable pressure support ventilator: Comparison with the Respiromics BiPAP /T. *Respir Care* 1996, 41:885-894.

57. Mehta S, Jay GD, Woolard RH, Hipona R, Connolly EM, Cimini DM, Drinkwine JH, **Hill NS**. Randomized prospective trial of bilevel vs continuous positive airway pressure in acute pulmonary edema. *Crit Care Med* 1997, 25:620-628.

58. Brem AS, Bina RB, **Hill N**, Alia C, Morris DJ. Effects of licorice derivatives on vascular smooth muscle function. *Life Sciences* 1997, 60:207-214.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

59. Colice GL, **Hill NS**, Lee Y-J, Du H, Klinger J, Leiter JC, Ou L-C. Exaggerated pulmonary hypertensive response to monocrotaline in rats susceptible to chronic mountain sickness *J Appl Physiol* 1997; 83:25-31.

60. Maramatsu M, Tyler RC, Gutkowska J, Klinger JR, **Hill NS**, Rodman DM, McMurry IF. Atrial natriuretic peptide activity accounts for increased cGMP in hypoxia-induced hypertensive rats. *J Appl Physiol* 1997; 72:L1126-L1132.

61. Meyer TJ, Pressman MR, Benditt J, McCool FD, Millman RP, Natarajan R, **Hill NS**. Air leaking through the mouth during nocturnal nasal ventilation: Effect on sleep quality. *Sleep* 1997; 20: 561-569.

62. **Hill NS**, Warburton RR, Pietras L, Klinger JR. Nonspecific endothelin receptor antagonist, bosentan, blunts monocrotaline-induced pulmonary hypertension in rats. *J Appl Physiol* 1997; 83:1209-1215.

63. Klinger JR, Wrenn DS, Warburton RR, Pietras L, Ou L-C, **Hill NS**. Atrial natriuretic peptide expression in rats with different pulmonary hypertensive responses to hypoxia. *Am J Physiol* 1997; 273; H411-H417.

64. Klinger JR, Warburton RR, Pietras L, **Hill NS**. Brain natriuretic peptide inhibits hypoxic pulmonary hypertension in rats. *J Appl Physiol* 1998; 84: 1646-1652.

65. Klinger JR, Siddig FM, Swift RA, Jackson C, Pietras L, Warburton RR, **Hill NS**. Plasma C-type natriuretic peptide levels are increased in rats exposed to chronic hypoxia. *Am J Physiol* 1998, (Lung) 275: L645-L652.

66. Bina RB, **Hill N**, Brem AS. Effect of serum on vascular smooth muscle function. *Life Sciences* 1998, 62: 1195-1201.

67. Klinger JR, Warburton R, Pietras L, Swift R, John S, Smithies O, and **Hill NS**. Genetic disruption of atrial natriuretic peptide causes pulmonary hypertension in normoxic and hypoxic mice. *Am J Physiol* 1999, 276: L868-L874.

68. Salameh G, Karamsetty MR, Warburton RR, Klinger JR, Ou L-C, **Hill NS**. Differences in acute hypoxic pulmonary vasoresponsiveness between rat strains: Role of endothelium. *J Appl Physiol* 1999, 87: 356-362.

69. Klings ES, **Hill NS**, Ieong MH, Simms RW, Korn JH, Farber HW. Systemic sclerosis associated pulmonary hypertension: acute and long-term effects of epoprostenol (prostacyclin). *Arthr Rheum* 1999, 42: 2638-2645.

70. Hunderliter AL, Willis PW, Long W, Clarke WR, Ralph D, Caldwell EJ, Williams W, Ettinger NA, **Hill NS**, Summer WR, de Boisblanc B, Koch G, Li S, Clayton LM, Jobsis MM, and Crow JW. Frequency of prognostic significance of pericardial effusion in primary pulmonary hypertension. *Am J Cardiol* 1999, 84: 481-484.

71. Badesch DB, Tapson VE, McGoon, MD, **Hill NS** (19th in list of 30 authors). A comparison of continuous intravenous epoprostenol with conventional therapy for pulmonary hypertension secondary to the scleroderma spectrum of disease. *Ann Intern Med*. 2000, 132: 425-434.

72. Karamsetty MR, Nakashima JM, Ou L-C, Klinger JR, **Hill NS**. EDHF contributes to strain- related differences in pulmonary arterial relaxation in rats. *Am J Physiol*. 2001, 280: L458-L464.

73. Mehta S, McCool FD, **Hill NS**. Leak compensation in positive pressure ventilators - a lung model study. *Eur Respir J* 2001, 17 (2): 259-267.

74. Karamsetty MR, Klinger JR, **Hill NS**. Phytoestrogens restore nitric oxide mediated relaxation in isolated pulmonary arteries from chronically hypoxic rats. *J Pharmacol Exp Ther* 2001, 297: 968-974.

75. Preston I, Klinger JR, Landzberg M, Houtchens J, Nelson D, **Hill NS**. Vasoresponsiveness of pulmonary hypertension associated with sarcoidosis. *Chest* 2001, 120:866-872.

76. Gay PL, Hess DR, **Hill NS**. Noninvasive proportional assist ventilation for acute respiratory insufficiency: Comparison with pressure support ventilation. *Am J Respir Crit Care Med* 2001, 164:1606-1611.

77. Karamsetty MR, Pietras L, Klinger JR, Lanzillo JJ, Leiter JC, Ou L-C, **Hill NS**. The role of endothelin-1 in strain-related susceptibility to develop hypoxic pulmonary hypertension in rats. *Respir Physiol* 2001, 128: 219-227.

78. Klinger JR, Pietras L, Warburton R, **Hill NS**. Reduced oxygen increases atrial natriuretic peptide release from atrial cardiocytes. *Exp Biol Med* 2001, 226:847-853.

79. Klinger JR, Warburton RR, Pietras L, Oliver P, Fox J, Smithies O, **Hill NS**. Targeted disruption of the gene for natriuretic receptor-A worsens hypoxia-induced cardiac hypertrophy. *Am J Physiol Heart Circ Physiol* 2002 ; 282:H58-65.

80. Chu J, Wang R, **Hill NS**. Update in Clinical Toxicology. *Am J Respir Crit Care Med* 2002; 166:9-15.

81. Ward NS, LinDY, Nelson DL, Houtchens J, Schwartz WA, Klinger JR, **Hill NS**, Levy MM. Successful determination of lower inflection point and maximal compliance in a population of patients with ARDS. *Crit Care Med* 2002; 30:963-968.

82. Vachiery JL, **Hill N**, Zwicke D, Barst R, Blackburn S, Naeije R. Transitioning from I.V. Epoprostenol to Subcutaneous Treprostinil in Pulmonary Arterial Hypertension. *Chest*. 2002 May;121(5):1561-5.

83. Raymond RJ, Hunderliter AL, Willis PW, Ralph D, Caldwell EJ, Williams W, Ettinger NA, **Hill NS**, Summer WR, de Boisblanc B, Schwartz T, Koch G, Clayton LM, Jobsis MM, Crow JW, Long W. Echocardiographic predictors of adverse outcomes in primary pulmonary hypertension. *J Am Coll Cardiol* 2002; 39:1214-1219.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

84. **Hill NS**, Carlisle C, Kramer NR. Effect of a nonrebreathing valve on long-term nasal ventilation using a bilevel device. *Chest* 2002; 122:84-91.

85. Karamsetty MR, Klinger JR, **Hill NS**. Evidence for the role of p38 MAP kinase in hypoxia-induced pulmonary vasoconstriction. *Am J Physiol lung Cell Mol Physiol* 2002; 283:L859-866.

86. Kwok H, McCormack J, Cece R, Houtchens J, **Hill NS**. Controlled trial of oronasal versus nasal mask ventilation in the treatment of acute respiratory failure. *Crit Care Med* 2003; 31:468-473.

87. Liesching T, Kwok H, **Hill NS**. Acute applications of noninvasive positive pressure ventilation. *Chest* 2003; 124:699-713.

88. Hinderliter AL, Willis PW 4th, Long WA, Clarke WR, Ralph D, Caldwell EJ, Williams W, Ettinger NA, **Hill NS**, Summer WR, de Boisblanc B, Koch G, Li S, Clayton LM, Jobsis MM, Crow JW: PPH Study Group. Frequency and severity of tricuspid regurgitation determined by Doppler echocardiography in primary pulmonary hypertension. *Am J Cardio*. 2003; 91:1033-7.

89. Keenan SP, Sinuff T, Cook DJ, **Hill NS**: Which patient with acute exacerbation of chronic obstructive pulmonary disease benefit from noninvasive positive-pressure ventilation? A systematic review of the literature. *Ann Intern Med*. 2003 June 3; 138(11):127.

90. Budhiraja R, Kayyali US, Karemsetty M, Fogel M, **Hill NS**, Chalkley R, Finlay GA, Hassoun PM. Estrogen modulates xanthine dehydrogenase/xanthine oxidase activity by a receptor-independent mechanism. *Antioxid Redox Signal* 2003; 5:705-711.

91. Keenan SP, Sinuff T, Cook DJ, **Hill NS**: Does noninvasive positive pressure ventilation improve outcome in acute hypoxic respiratory failure? A systematic review. *Crit Care Med*. 2004, Dec. 32(12):2516-2523.

92. Esteban A, Frutos-Vivar F, Ferguson ND, Arabi Y, Apezteguia C, Gonzalez M, Epstein, SK, **Hill NS**, Nava S, Soares MA, D'Empaire G, Alia I, Anzueto A. Noninvasive positive pressure ventilation for respiratory failure after extubation. *N Engl J Med* 2004, June 350(24): 2452-2460.

93. Preston IR, **Hill NS**, Gambardella LS, Warburton RR, Klinger RJ. Synergistic effects of ANP and sildenafil on cGMP levels and amelioration of acute hypoxic pulmonary hypertension. *Exp Biol Med (Maywood)* 2004, Oct: 229(9): 920-925.

94. Barst RJ, Langleben D, Frost A, Horn EM, Oudiz R, Shapiro S, McLaughlin V, **Hill N**, Tapson VF, Robbins IM, Zwicke D, Duncan B, Dixon RA, Frumkin LR; STRIDE-1 Study Group. Sitaxsentan therapy for pulmonary arterial hypertension. *Am J Respir Crit Care Med*. 2004 Feb 15;169(4):441-7.

95. Levy M, Tanios MA, Nelson D, Short K, Senechia A, Vespa J, **Hill NS**. Outcomes of patients with do-not-intubate orders treated with noninvasive ventilation. *Crit Care Med*. 2004, Oct: 32(10): 2002-2007.

96. Perrin C, D'Ambrosio C, Unterborn J, **Hill NS**. Pulmonary complications and management of chronic neuromuscular disease. *Muscle & Nerve* 2005 Jan; 29(1):5-27.

97. Preston IR, Tang G, Tilan JU, **Hill NS**, Suzuki YJ. Retinoids and pulmonary hypertension. *Circulation* 2005, Feb; 111(6): 782-790.

98. Frost AE, Langleben D, Oudiz R, **Hill N**, Horn E, McLaughlin V, Robbins IM, Shapiro S, Tapson VF, Zwicke D, DeMarco T, Schilz R, Rubenfire M, Barst RJ. The 6-min walk test (6MW) as an efficacy endpoint in pulmonary arterial hypertension clinical trials: demonstration of a ceiling effect. *Vascul Pharmacol*. 2005 Jun;43(1):36-9.

99. Diaz GG, Alcaraz AC, Talavera JC, Perez PJ, Rodriguez AE, Cordoba FG, **Hill NS**. Noninvasive positive pressure ventilation to treat hypercapneic coma secondary to respiratory failure. *Chest* 2005; 127(3): 952-960.

100. Preston IR, Klinger JR, Houtchens J, Nelson D, Farber HW, **Hill NS**. Acute and chronic effects of sildenafil in patients with pulmonary arterial hypertension. *Respir Med* 2005 May2005 Dec;99(12):1501-10.

101. Preston IR, **Hill NS**, Warburton RR, Fanburg BL. The role of 12-lipoxygenase in hypoxia-induced rat pulmonary artery smooth muscle cell proliferation. *Am J Physiol Lung Cell Mol Physiol* 2006 Feb;290(2):L367-74.

102. Klinger JR, Thaker S, Houtchens J, Preston IR, **Hill NS**, Farber HW. Pulmonary hemodynamic responses to brain natriuretic peptide and sildenafil in patients with pulmonary arterial hypertension. *Chest*. 2006 Feb; 129(2):417-25.

103. Maheshwari V, Paioli D, Rothaar R, **Hill NS**. Utilization of noninvasive ventilation in acute care hospitals: a regional survey. *Chest*. 2006 May; 129(5):1226-33.

104. Steiner MK, Preston IR, Klinger JR, Criner GJ, Waxman AB, Farber HW, **Hill NS**. Conversion to bosentan from prostacyclin infusion therapy in pulmonary arterial hypertension: a pilot study. *Chest*. 2006 Nov; 130(5):1471-80.

105. Frutos-Vivar F, Ferguson ND. Esteban A, Epstein SK, Arabi Y, Apezteguia C, Gonzalez M, **Hill NS**. Risk factors for extubation failure in patients following a successful spontaneous breathing trial. *Chest* Dec 2006 130(6):1554-1671.

106. **Hill NS**, Brennan J, Garpestad E, Nava S. Noninvasive ventilation for critical care. *Crit Care Med* 2007;35(10):2402-

107. Garpestad E, Brennan, J, **Hill NS**. Noninvasive ventilation in acute respiratory failure. *Chest* Aug 2007; 132(2):711-20.

108. Garpestad E, Brennan J, **Hill NS**. Noninvasive ventilation for critical care. *Chest* 2007 Aug; 132(2):711-20.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

109. Liu Y, Li M, Warburton RR, **Hill NS**, Fanburg BF. The 5-HT transporter transactivates the PDGFbeta receptor in pulmonary arteri smooth muscle cells. *FASEB J* Sept 2007; 21(11):2725-2734.

110. **Hill NS**, Brennan J, Garpestad E, Nava S. Noninvasive ventilation in acute respiratory failure. *Crit Care Med*. 2007 Oct; 35(10):2402-7.

111. Liu T, Warburton RR, Guevara OE, **Hill NS**, Fanburg BF; Gaestel M, Kayyali US. Lack of MK2 Inhibits myofibroblast formation and exacerbates pulmonary fibrosis. *Am J Respir Cell Mol Biol*. Nov. 2007; 37(5):507-517.

112. Girgis RE, Frost AE, **Hill NS**, Horn EM, Langleben D, McLaughlin VV, Oudiz RJ, Robbins IM, Seibold JR, Shapiro S, Tapson VF, Barst JR. Selective endothelin a receptor antagonism with sitaxsentan for pulmonary arterial hypertension associated with connective tissue disease. *Ann Rheum Dis*. 2007, Nov, 66(11)1467-1472.

113. Devlin JW, Nava S, Fong JJ, Bahhady I, **Hill NS**. Survey of sedation practices during noninvasive positive pressure ventilation to treat acute respiratory failure. *Crit Care Med*. 2007; Oct 35(10):2298-2303.

114. Curtis JR, Cook DJ, Sinuff T, White DB, **Hill N**, Keenan SP, Benditt JO, Kacmarek R, Kirchhoff KT, Levy MM. Noninvasive positive pressure ventilation in critical and palliative care settings: understanding the goals of therapy. *Society of Critical Care Medicine Palliative Noninvasive Positive VentilationTask Force.Crit Care Med*. 2007 Mar; 35(3):932-9.

115. Scala R, Nava S, Conti G, Antonelli M, Naldi M, Archinucci I, Coniglio G, **Hill NS**. Noninvasive versus conventional ventilation to treat hypercapnic encephalopathy in chronic obstructive pulmonary disease. *Intensive Care Med*. 2007 Dec; 33(12):2101-8.

116. Badesch DB, **Hill NS**, Burgess G, Rubin LJ, Barst RJ, Galiè N, Simonneau G; SUPER Study Group. Sildenafil for pulmonary arterial hypertension associated with connective tissue disease. *J Rheumatol*. 2007 Dec; 34(12):2417-22.

117. Sinuff T, Cook DJ, Keenan SP, Burns KE, Adhikari NK, Rocker GM, Mehta S, Kacmarek R, Eva K, **Hill NS**. Noninvasive ventilation for acute respiratory failure near the end of life. *Crit Care Med*. 2008 Mar; 36(3):789-94. PMID: 18209669.

118. Ozsancak A, D'Ambrosio C, **Hill NS**. Nocturnal noninvasive ventilation. *Chest* 2008 May; 133(5):1275-86.

119. Nava S, Santoro C, Grassi M, **Hill N**. The influence of the media on COPD patients' knowledge regarding cardiopulmonary resuscitation. *Int J Chron Obstruct Pulmon Dis*. 2008; 3(2):295-300.

120. Nava S, **Hill N**. Non-invasive ventilation in acute respiratory failure. *Lancet*. 2009 Jul 18;374(9685):250-9. doi: 10.1016/S0140-6736(09)60496-7. Review. PMID: 19616722 .

121. O'Connor HH, Kirby KJ, Terrin N, **Hill NS**, White AC. Decannulation following tracheostomy for prolonged mechanical ventilation. *J Intensive Care Med*. 2009 May-Jun; 24(3):187-94.

122. Liu T, Guevara OE, Warburton RR, **Hill NS**, Gaestel M, Kayyali US. Modulation of HSP27 alters hypoxia-induced endothelial permeability and related signaling Pathways. *J Cell Physiol*. 2009 Sep; 220(3):600-10.

123. Ferreira JC, Chipman DW, **Hill NS**, Kacmarek RM. Bilevel vs ICU ventilators providing noninvasive ventilation: effect of system leaks: a COPD lung model comparison. *Chest*. 2009 Aug; 136(2): 448-56.

124. White AC, Joseph B, Gireesh A, Shantilal P, Garpestad E, **Hill NS**, O'Connor HH. Terminal withdrawal of mechanical ventilation at a long-term acute care hospital: comparison with a medical ICU. *Chest*. 2009 Aug;136(2):465-70.

125. Devlin JW, Roberts RJ, Fong JJ, Skrobik Y, Riker RR, **Hill NS**, Robbins T, Garpestad E. Efficacy and safety of quetiapine in critically ill patients with delirium: A prospective, multicenter, randomized, double-blind, placebo-controlled pilot study. *Crit Care Med*. 2010 Feb; 38(2):419-27.

126. Chan MC, Hilyard AC, Wu C, Davis BN, **Hill NS**, Lal A, Lieberman J, Lagna G, Hata A. Molecular basis for antagonism between PDGF and the TGFbeta family of signaling pathways by control of miR-24 expression. *EMBO J*. 2010 Feb 3; 29(3):559-73.

127. Minai OA, Nathan SD, **Hill NS**, Badesch DB, Stoller JK. Pulmonary hypertension in lung diseases: survey of beliefs and practice patterns. *Respir Med*. 2010 May; 104(5):741-8.

128. Vitacca M, Grassi M, Barbano L, Galavotti G, Sturani C, Vianello A, Zanotti E, Ballerini L, Potena A, Scala R, Peratoner A, Ceriana P, Di Buono L, Clini E, Ambrosino N, **Hill N**, Nava S. Last 3 months of life in home-ventilated patients: the family perception. *Eur Respir J*. 2010 May;35(5):1064-71. doi: 10.1183/09031936.00061009. PMID: 19717483.

129. Liu T, Guevara OE, Warburton RR, **Hill NS**, Gaestel M, Kayyali US. Regulation of vimentin intermediate filaments in endothelial cells by hypoxia. *Am J Physiol Cell Physiol*. 2010 Apr 28.

130. Casserly B, Pietras L, Schuyler J, Wang R, **Hill NS**, Klinger JR. Cardiac atria are the primary source of ANP release in hypoxia-adapted rats. *Life Sci*. 2010 Sep 11; 87(11-12):382-9.

131. Chan MC, Weisman AS, Kang H, Nguyen PH, Hickman T, Mecker SV, **Hill NS**, Lagna G, Hata A. The amiloride derivative phenamil attenuates pulmonary vascular remodeling by activating NFAT and the bone morphogenetic protein signaling pathway. *Mol Cell Biol*. 2011 Feb; 31(3):517-30.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

132. Mehta S, **Hill NS**. Noninvasive ventilation. State of the art. In: Am J Respir Crit Care Med 2011; 163:540-77.

133. Ozsancak A, Sidhom S, Liesching TN, Howard W, **Hill NS**. Evaluation of The Total Face MaskTM For Noninvasive Ventilation To Treat Acute Respiratory Failure. Chest. 2011 Feb 1.

134. Kawut SM, Bagiella E, Lederer DJ, Shimbo D, Horn EM, Roberts KE, **Hill NS**, Barr RG, Rosenzweig EB, Post W, Tracy RP, Palevsky HI, Hassoun PM, Girgis RE; ASA-STAT Study Group. Randomized clinical trial of aspirin and simvastatin for pulmonary arterial hypertension: ASA-STAT: Circulation. 2011 Jun 28; 123(25):2985-93.

135. Devlin JW, Skrobik Y, Riker RR, Hinderleider E, Roberts RJ, Fong JJ, Ruthazer R, **Hill NS**, Garpestad E. Impact of quetiapine on resolution of individual delirium symptoms in critically ill patients with delirium: a post-hoc analysis of a double-blind, randomized, placebo-controlled study. Crit Care. 2011; 15(5):R215. Epub 2011 Sep 17.

136. Liu T, Milia E, Warburton RR, **Hill NS**, Gaestel M, Kayyali US. Anthrax lethal toxin disrupts the endothelial permeability barrier through blocking p38 signaling: J Cell Physiol. 2012 Apr; 227(4):1438-45.

137. Wei L, Warburton RR, Preston IR, Roberts KE, Comhair SA, Erzurum SC, **Hill NS**, Fanburg BL. Serotonylated fibronectin is elevated in pulmonary hypertension. Am J Physiol Lung Cell Mol Physiol. 2012 Jun 15; 302(12):L1273-9. Epub 2012 Apr 20.

138. Lukácsovits J, Carlucci A, **Hill N**, Ceriana P, Pisani L, Schreiber A, Pierucci P, Losonczy G, Nava S. Physiological changes during low- and high-intensity noninvasive ventilation. Eur Respir J. 2012 Apr;39(4):869-75. doi: 10.1183/09031936.00056111. PMID: 21885393.

139. Yu J, Taylor L, Rich C, Toselli P, Stone P, Green D, Warburton R, **Hill N**, Goldstein R, Polgar P. Transgenic expression of an altered angiotensin type I AT1 receptor resulting in marked modulation of vascular type I collagen. J Cell Physiol. 2012 May;227(5):2013-21. doi: 10.1002/jcp.22929. PMID: 21751211.

140. Wang D, Prakash J, Nguyen P, Davis-Dusenberry BN, **Hill NS**, Layne MD, Hata A, Lagna G. Bone morphogenetic protein signaling in vascular disease: anti-inflammatory action through myocardin-related transcription factor. A.J Biol Chem. 2012 Aug;10;287(33):28067-77. Epub 2012 Jun 20. PMID: 22718766

141. Wong CM, Preston IR, **Hill NS**, Suzuki YJ. Iron chelation inhibits the development of pulmonary vascular remodeling. Free Radic Biol Med. 2012 Nov 1; 53(9):1738-47. Epub 2012 Aug 25.

142. Sagliani KD, Dolnikowski GG, **Hill NS**, Fanburg BL, Levy BD, Preston IR. Differences between basal lung levels of select eicosanoids in rat and mouse. Pulm Circ. 2013 Jan; 3(1):82-8.

143. Preston IR, Sagliani KD, Roberts KE, Shah AM, Desouza SA, Howard W, Brennan J, **Hill NS**. Comparison of acute hemodynamic effects of inhaled nitric oxide and inhaled epoprostenol in patients with pulmonary hypertension. Pulm Circ. 2013 Jan; 3(1):68-73.

144. Preston IR, Sagliani KD, Warburton RR, **Hill NS**, Fanburg BL, Jaffe IZ. Mineralocorticoid receptor antagonism attenuates experimental pulmonary hypertension. Am J Physiol Lung Cell Mol Physiol. 2013 May 15; 304(10):L678-88.

145. Minai OA, Yared JP, Kaw R, Subramaniam K, **Hill NS**. Perioperative risk and management in patients with pulmonary hypertension. Chest. 2013 Jul; 144(1):329-40.

146. Kapur NK, Paruchuri V, Aronovitz MJ, Qiao X, Mackey EE, Daly GH, Ughreja K, Levine J, Blanton R, **Hill NS**, Karas RH. Biventricular remodeling in murine models of right ventricular pressure overload. PLoS One. 2013 Jul 30;8(7):e70802.

147. Sadoughi A, Roberts KE, Preston IR, Lai GP, McCollister DH, Farber HW, **Hill NS**. Use of selective serotonin reuptake inhibitors and outcomes in pulmonary arterial hypertension. Chest. 2013 Aug; 144(2):531-41.

148. Green DS, Rupasinghe C, Warburton R, Wilson JL, Sallum CO, Taylor L, Yatawara A, Mierke D, Polgar P, **Hill N**. A cell permeable peptide targeting the intracellular loop 2 of endothelin B receptor reduces pulmonary hypertension in a hypoxic rat model. PLoS One. 2013 Nov 27;8(11):e81309. doi: 10.1371/journal.pone.0081309. PMID: 24312288.

149. Khanna D, Tan M, Furst DE, **Hill NS**, McLaughlin VV, Silver RM, Steen VD, Langer A, Seibold JR. Recognition of pulmonary hypertension in the rheumatology community: lessons from a Quality Enhancement Research Initiative. Clin Exp Rheumatol. 2013 Dec 2.

150. Diraimondo TR, Klöck C, Warburton R, Herrera Z, Penumatsa K, Toksoz D, **Hill N**, Khosla C, Fanburg B. Elevated transglutaminase 2 activity is associated with hypoxia-induced experimental pulmonary hypertension in mice. ACS Chem Biol. 2014 Jan 17; 9(1):266-75.

151. Liesching T, Nelson DL, Cormier KL, Sucov A, Short K, Warburton R, **Hill NS**. Randomized trial of bilevel versus continuous positive airway pressure for acute pulmonary edema. J Emerg Med. 2014 Jan;46(1):130-40. . Epub 2013 Sep 24. ID: 24071031.

152. Ugurlu AO, Sidhom SS, Khodabandeh A, Ieong M, Mohr C, Lin DY, Buchwald I, Bahhady I, Wengryn J, Maheshwari V, **Hill NS**. Use and Outcomes of Noninvasive Positive Pressure Ventilation in Acute Care Hospitals in Massachusetts. Chest. 2014 Jan 30.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

153. Ozsancak Ugurlu A, Sidhom SS, Khodabandeh A, Ieong M, Mohr C, Lin DY, Buchwald I, Bahhady I, Wengryn J, Maheshwari V, **Hill NS**. Use and outcomes of noninvasive positive pressure ventilation in acute care hospitals in Massachusetts. *Chest*. 2014 May; 145(5):964-71.

154. Devlin JW, Al-Qadheeb NS, Chi A, Roberts RJ, Qawi I, Garpestad E, **Hill NS**. Efficacy and safety of early dexmedetomidine during noninvasive ventilation for patients with acute respiratory failure: a randomized, double-blind, placebo-controlled pilot study. *Chest*. 2014 Jun; 145(6):1204-12.

155. Kapur NK, Qiao X, Paruchuri V, Mackey EE, Daly GH, Ughreja K, Morine KJ, Levine J, Aronovitz MJ, **Hill NS**, Jaffe IZ, Letarte M, Karas RH. Reducing endoglin activity limits calcineurin and TRPC-6 expression and improves survival in a mouse model of right ventricular pressure overload. *J Am Heart Assoc*. 2014 Jul 11;3(4). pii: e000965.

156. Preston IR, Feldman J, White J, Franco V, Ishizawar D, Burger C, Waxman AB, **Hill NS**. Safety and efficacy of transition from inhaled treprostinil to parenteral treprostinil in selected patients with pulmonary arterial hypertension. *Pulm Circ*. 2014 Sep;4(3):456-61. doi: 10.1086/677360. PMID: 25621159.

157. Liu T, Ghamloush MM, Aldawood A, Warburton R, Toksoz D, **Hill NS**, Tang DD, Kayyali US. Modulating endothelial barrier function by targeting vimentin phosphorylation. *J Cell Physiol*. 2014 Oct; 229(10):1484-93.

158. Sprung CL, Truog RD, Curtis JR, Joynt GM, Baras M, Michalsen A, Briegel J, Kesecioglu J, Efferen L, De Robertis E, Bulpa P, Metnitz P, Patil N, Hawryluck L, Manthous C, Moreno R, Leonard S, **Hill NS**, Wennberg E, McDermid RC, Mikstacki A, Mularski RA, Hartog CS, Avidan A. Seeking worldwide professional consensus on the principles of end-of-life care for the critically ill. The Consensus for Worldwide End-of-Life Practice for Patients in Intensive Care Units (WELPICUS) study. *Am J Respir Crit Care Med*. 2014 Oct 15; 190(8):855-66.

159. Penumatsa K, Abualkhair S, Wei L, Warburton R, Preston I, **Hill NS**, Watts SW, Fanburg BL, Toksoz D. Tissue transglutaminase promotes serotonin-induced AKT signaling and mitogenesis in pulmonary vascular smooth muscle cells. *Cell Signal*. 2014 Dec; 26(12):2818-25. Epub 2014 Sep 15.

160. Lindenauer PK, Stefan MS, Shieh MS, Pekow PS, Rothberg MB, **Hill NS**. Outcomes associated with invasive and noninvasive ventilation among patients hospitalized with exacerbations of chronic obstructive pulmonary disease. *JAMA Intern Med*. 2014 Dec 1; 174(12):1982-93.

161. Wilson JL, Rupasinghe C, Usheva A, Warburton R, Kaplan C, Taylor L, **Hill N**, Mierke DF, Polgar P. Modulating the dysregulated migration of pulmonary arterial hypertensive smooth muscle cells with motif mimicking cell permeable peptides. *Curr Top Pept Protein Res*. 2015;16:1-17. PMID: 27274622.

162. **Hill NS**, Badesch D, Benza RL, D'Eletto TA, Farber HW, Gomberg-Maitland M, Hassoun PM, Preston I. Perspectives On Oral Pulmonary Hypertension Therapies Recently Approved by the Food and Drug Administration. *Ann Am Thorac Soc*. 2015 Jan 15.

163. Lindenauer PK, Stefan MS, Shieh MS, Pekow PS, Rothberg MB, **Hill NS**. Hospital patterns of mechanical ventilation for patients with exacerbations of COPD. *Ann Am Thorac Soc*. 2015 Mar;12(3):402-9. doi: 10.1513/AnnalsATS.201407-293OC. PMID: 25654431.

164. Ismail K, Roberts K, Manning P, Manley C, **Hill NS**. OSA and pulmonary hypertension: time for a new look. *Chest*. 2015 Mar;147(3):847-61. doi: 10.1378/chest.14-0614. Review. PMID: 25732450.

165. Stefan MS, Shieh MS, Pekow PS, **Hill N**, Rothberg MB, Lindenauer PK. Trends in mechanical ventilation among patients hospitalized with acute exacerbations of COPD in the United States, 2001 to 2011. *Chest*. 2015 Apr;147(4):959-68. doi: 10.1378/chest.14-1216. PMID: 25375230.

166. Al-Naamani N, Preston IR, Paulus JK, **Hill NS**, Roberts KE. Pulmonary Arterial Capacitance Is an Important Predictor of Mortality in Heart Failure With a Preserved Ejection Fraction. *JACC Heart Fail*. 2015 Jun;3(6):467-74. doi: 10.1016/j.jchf.2015.01.013. PMID: 26046840.

167. Spoletini G, Alotaibi M, Blasi F, **Hill NS**. Heated Humidified High-Flow Nasal Oxygen in Adults: Mechanisms of Action and Clinical Implications. *Chest*. 2015 Jul;148(1):253-61. doi: 10.1378/chest.14-2871. Review. PMID: 25742321.

168. Liu T, Warburton RR, **Hill NS**, Kayyali US. Anthrax lethal toxin-induced lung injury and treatment by activating MK2. *J Appl Physiol* (1985). 2015 Aug 15;119(4):412-9. doi: 10.1152/japplphysiol.00335.2015. PMID: 26066827.

169. Ozsancak Ugurlu A, Sidhom SS, Khodabandeh A, Ieong M, Mohr C, Lin DY, Buchwald I, Bahhady I, Wengryn J, Maheshwari V, **Hill NS**. Where is Noninvasive Ventilation Actually Delivered for Acute Respiratory Failure? *Lung*. 2015 Oct;193(5):779-88. doi: 10.1007/s00408-015-9766-y. PMID: 26210474.

170. Preston IR, Roberts KE, Miller DP, Sen GP, Selej M, Benton WW, **Hill NS**, Farber HW. Effect of Warfarin Treatment on Survival of Patients With Pulmonary Arterial Hypertension (PAH) in the Registry to Evaluate Early and Long-Term PAH Disease Management (REVEAL). *Circulation*. 2015 Dec 22;132(25):2403-11. doi: 10.1161/CIRCULATIONAHA.115.018435. PMID: 26510696.

171. Ozsancak Ugurlu A, Sidhom SS, Khodabandeh A, Ieong M, Mohr C, Lin DY, Buchwald I, Bahhady I, Wengryn J, Maheshwari V, **Hill NS**. Use and Outcomes of Noninvasive Ventilation for Acute Respiratory Failure in Different Age Groups. *Respir Care*. 2016 Jan;61(1):36-43. doi: 10.4187/respcare.03966. PMID: 26374908.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

172. Stefan MS, Nathanson BH, Priya A, Pekow PS, Lagu T, Steingrub JS, **Hill NS**, Goldberg RJ, Kent DM, Lindenauer PK. Hospitals' Patterns of Use of Noninvasive Ventilation in Patients With Asthma Exacerbation. *Chest*. 2016 Mar;149(3):729-36. doi: 10.1016/j.chest.2015.12.013. PMID: 26836902.

173. Bear MD, Liu T, Abualkhair S, Ghalmoush MA, **Hill NS**, Preston I, Fanburg BL, Kayyali US, Toksoz D. Alpha-Catulin Co-Localizes With Vimentin Intermediate Filaments and Functions in Pulmonary Vascular Endothelial Cell Migration via ROCK. *J Cell Physiol*. 2016 Apr;231(4):934-43. doi: 10.1002/jcp.25185. PMID: 26377600.

174. Al-Naamani N, Espitia H G, Velazquez-Moreno H, Macuil-Chazarro B, Serrano-Lopez A, Vega-Barrientos RS, **Hill NS**, Preston IR. Chronic Thromboembolic Pulmonary Hypertension: Experience from a Single Center in Mexico. *Lung*. 2016 Apr;194(2):315-23. doi: 10.1007/s00408-016-9842-y. PMID: 26748498.

175. Richter SE, Roberts KE, Preston IR, **Hill NS**. A Simple Derived Prediction Score for the Identification of an Elevated Pulmonary Artery Wedge Pressure Using Precatheterization Clinical Data in Patients Referred to a Pulmonary Hypertension Center. *Chest*. 2016 May;149(5):1261-8. doi: 10.1378/chest.15-0819. PMID: 26501213.

176. Ventetuolo CE, Baird GL, Barr RG, Bluemke DA, Fritz JS, **Hill NS**, Klinger JR, Lima JA, Ouyang P, Palevsky HI, Palmisciano AJ, Krishnan I, Pinder D, Preston IR, Roberts KE, Kawut SM. Higher Estradiol and Lower Dehydroepiandrosterone-Sulfate Levels Are Associated with Pulmonary Arterial Hypertension in Men. *Am J Respir Crit Care Med*. 2016 May 15;193(10):1168-75. doi: 10.1164/rccm.201509-1785OC. PMID: 26651504.

177. Al-Naamani N, Sagliani KD, Dolnikowski GG, Warburton RR, Toksoz D, Kayyali U, **Hill NS**, Fanburg BL, Roberts KE, Preston IR. Plasma 12- and 15-hydroxyeicosanoids are predictors of survival in pulmonary arterial hypertension. *Pulm Circ*. 2016 Jun;6(2):224-33. doi: 10.1086/686311. PMID: 27252849.

178. Stefan MS, Nathanson BH, Lagu T, Priya A, Pekow PS, Steingrub JS, **Hill NS**, Goldberg RJ, Kent DM, Lindenauer PK. Outcomes of Noninvasive and Invasive Ventilation in Patients Hospitalized with Asthma Exacerbation. *Ann Am Thorac Soc*. 2016 Jul;13(7):1096-104. doi: 10.1513/AnnalsATS.201510-701OC. PMID: 27070493.

179. Stefan MS, **Hill NS**, Raghunathan K, Liu X, Pekow PS, Memtsoudis SG, Ramachandran SK, Lindenauer PK. Outcomes Associated with Early Postoperative Noninvasive Ventilation in Bariatric Surgical Patients with Sleep Apnea. *J Clin Sleep Med*. 2016 Nov 15;12(11):1507-1516. PMID: 27568901.

180. Al-Naamani N, Preston IR, **Hill NS**, Roberts KE. The prognostic significance of pulmonary arterial capacitance in pulmonary arterial hypertension: single-center experience. *Pulm Circ*. 2016 Dec;6(4):608-610. doi: 10.1086/688900. PMID: 28090304.

181. Stefan MS, Pekow PS, Shieh MS, **Hill NS**, Rothberg MB, Fisher KA, Lindenauer PK. Hospital Volume and Outcomes of Noninvasive Ventilation in Patients Hospitalized With an Acute Exacerbation of Chronic Obstructive Pulmonary Disease. *Crit Care Med*. 2017 Jan;45(1):20-27. PMID: 27509388.

182. Covella M, Rowin EJ, **Hill NS**, Preston IR, Milan A, Opotowsky AR, Maron BJ, Maron MS, Maron BA. Mechanism of Progressive Heart Failure and Significance of Pulmonary Hypertension in Obstructive Hypertrophic Cardiomyopathy. *Circ Heart Fail*. 2017 Apr;10(4):e003689. doi: 10.1161/CIRCHEARTFAILURE.116.003689. PMID: 28396501.

183. **Hill NS**, Rahaghi FF, Sood N, Frey R, Ghofrani HA. Individual dose adjustment of riociguat in patients with pulmonary arterial hypertension and chronic thromboembolic pulmonary hypertension. *Respir Med*. 2017 Aug;129:124-129. doi: 10.1016/j.rmed.2017.05.005. Epub 2017 May 15. Review. PMID: 28732819.

184. Hemnes AR, Beck GJ, Newman JH, Abidov A, Aldred MA, Barnard J, Berman Rosenzweig E, Borlaug BA, Chung WK, Comhair SAA, Erzurum SC, Frantz RP, Gray MP, Grunig G, Hassoun PM, **Hill NS**, Horn EM, Hu B, Lempel JK, Maron BA, Mathai SC, Olman MA, Rischard FP, Systrom DM, Tang WHW, Waxman AB, Xiao L, Yuan JX, Leopold JA; PVDOMICS Study Group. PVDOMICS: A Multi-Center Study to Improve Understanding of Pulmonary Vascular Disease Through Phenomics. *Circ Res*. 2017 Oct 27;121(10):1136-1139. doi: 10.1161/CIRCRESAHA.117.311737. PMID: 29074534

185. Hashemian SM, Mortaz E, Jamaati H, Bagheri L, Mohajerani SA, Garssen J, Movassaghi M, Barnes PJ, **Hill NS**, Adcock IM. Budesonide facilitates weaning from mechanical ventilation in difficult-to-wean very severe COPD patients: Association with inflammatory mediators and cells. *J Crit Care*. 2018 Apr;44:161-167. doi: 10.1016/j.jcrc.2017.10.045. Epub 2017 Oct 31. PMID: 29127842 Clinical Trial

186. Fisher KA, Mazor KM, Goff S, Stefan MS, Pekow PS, Williams LA, Rastegar V, Rothberg MB, **Hill NS**, Lindenauer PK. Successful Use of Noninvasive Ventilation in Chronic Obstructive Pulmonary Disease. How Do High-Performing Hospitals Do It? *Ann Am Thorac Soc*. 2017 Nov;14(11):1674-1681. doi: 10.1513/AnnalsATS.201612-1005OC. PMID: 28719228.

187. Penumatsa KC, Toksoz D, Warburton RR, Kharnaf M, Preston IR, Kapur NK, Khosla C, **Hill NS**, Fanburg BL. Transglutaminase 2 in pulmonary and cardiac tissue remodeling in experimental pulmonary hypertension. *Am J Physiol Lung Cell Mol Physiol*. 2017 Nov 1;313(5):L752-L762. doi: 10.1152/ajplung.00170.2017. Epub 2017 Aug 3. PMID: 28775095.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

188. Nwankwo JO, Gremmel T, Gerrits AJ, Mithila FJ, Warburton RR, **Hill NS**, Lu Y, Richey LJ, Jakubowski JA, Frelinger AL 3rd, Chishti AH. Calpain-1 regulates platelet function in a humanized mouse model of sickle cell disease. *Thromb Res.* 2017 Dec;160:58-65. doi: 10.1016/j.thromres.2017.10.018. Epub 2017 Oct 26. PMID: 29101791.

189. Stefan MS, Priya A, Pekow PS, Lagu T, Steingrub JS, **Hill NS**, Nathanson BH, Lindenauer PK. The comparative effectiveness of noninvasive and invasive ventilation in patients with pneumonia. *J Crit Care.* 2018 Feb;43:190-196. doi: 10.1016/j.jcrc.2017.05.023. Epub 2017 May 23. PMID: 28915393

190. Wilson JL, Warburton R, Taylor L, Toksoz D, **Hill N**, Polgar P. Unraveling endothelin-1 induced hypercontractility of human pulmonary artery smooth muscle cells from patients with pulmonary arterial hypertension. *PLoS One.* 2018 Apr 12;13(4):e0195780. doi: 10.1371/journal.pone.0195780. eCollection 2018. PMID: 29649319

191. Skrobik Y, Duprey MS, **Hill NS**, Devlin JW. Low-Dose Nocturnal Dexmedetomidine Prevents ICU Delirium. A Randomized, Placebo-controlled Trial. *Am J Respir Crit Care Med.* 2018 May 1;197(9):1147-1156. doi: 10.1164/rccm.201710-1995OC. Clinical Trial. PMID: 29498534

192. Baird GL, Archer-Chicko C, Barr RG, Bluemke DA, Foderaro AE, Fritz JS, **Hill NS**, Kawut SM, Klinger JR, Lima JAC, Mullin CJ, Ouyang P, Palevsky HI, Palmisano AJ, Pinder D, Preston IR, Roberts KE, Smith KA, Walsh T, Whittenhall M, Ventetuolo CE. Lower DHEA-S levels predict disease and worse outcomes in post-menopausal women with idiopathic, connective tissue disease- and congenital heart disease-associated pulmonary arterial hypertension. *Eur Respir J.* 2018 Jun 28;51(6). pii: 1800467. doi: 10.1183/13993003.00467-2018. Print 2018 Jun. PMID: 29954925

193. Rice LM, Mantero JC, Stratton EA, Warburton R, Roberts K, **Hill N**, Simms RW, Domsic R, Farber HW, Layfatis R. Serum biomarker for diagnostic evaluation of pulmonary arterial hypertension in systemic sclerosis. *Arthritis Res Ther.* 2018 Aug 16;20(1):185. doi: 10.1186/s13075-018-1679-8. PMID: 30115106

194. Spoletini G, Mega C, Pisani L, Alotaibi M, Khoja A, Price LL, Blasi F, Nava S, **Hill NS**. High-flow nasal therapy vs standard oxygen during breaks off noninvasive ventilation for acute respiratory failure: A pilot randomized controlled trial. *J Crit Care.* 2018 Dec;48:418-425. doi: 10.1016/j.jcrc.2018.10.004. Epub 2018 Oct 5. PMID: 30321833

195. Rhodes CJ, Batai K, Bleda M, Haimel M, Southgate L, Germain M, Pauciulo MW, Hadinnapola C, Aman J, Girerd B, Arora A, Knight J, Hanscombe KB, Karnes JH, Kaakinen M, Gall H, Ulrich A, Harbaum L, Cebola I, Ferrer J, Lutz K, Swietlik EM, Ahmad F, Amouyel P, Archer SL, Argula R, Austin ED, Badesch D, Bakshi S, Barnett C, Benza R, Bhatt N, Bogaard HJ, Burger CD, Chakinala M, Church C, Coghlan JG, Condliffe R, Corris PA, Danesino C, Debette S, Elliott CG, Elwing J, Eyries M, Fortin T, Franke A, Frantz RP, Frost A, Garcia JGN, Ghio S, Ghofrani HA, Gibbs JSR, Harley J, He H, **Hill NS**, Hirsch R, Houweling AC, Howard LS, Ivy D, Kiely DG, Klinger J, Kovacs G, Lahm T, Laudes M, Machado RD, MacKenzie Ross RV, Marsolo K, Martin LJ, Moledina S, Montani D, Nathan SD, Newnham M, Olschewski A, Olschewski H, Oudiz RJ, Ouwehand WH, Peacock AJ, Pepke-Zaba J, Rehman Z, Robbins I, Roden DM, Rosenzweig EB, Saydain G, Scelsi L, Schilz R, Seeger W, Shaffer CM, Simms RW, Simon M, Sitbon O, Suntharalingam J, Tang H, Tchourbanov AY, Thenappan T, Torres F, Toshner MR, Treacy CM, Vonk Noordegraaf A, Waisfisz Q, Walsworth AK, Walter RE, Wharton J, White RJ, Wilt J, Wort SJ, Yung D, Lawrie A, Humbert M, Soubrier F, Trégouët DA, Prokopenko I, Kittles R, Gräf S, Nichols WC, Trembath RC, Desai AA, Morrell NW, Wilkins MR; UK NIHR BioResource Rare Diseases Consortium; UK PAH Cohort Study Consortium; US PAH Biobank Consortium. Genetic determinants of risk in pulmonary arterial hypertension: international genome-wide association studies and meta-analysis. *Lancet Respir Med.* 2019 Mar;7(3):227-238. doi: 10.1016/S2213-2600(18)30409-0. Epub 2018 Dec 5. PMID: 30527956

196. National Heart, Lung, and Blood Institute PETAL Clinical Trials Network, Moss M, Huang DT, Brower RG, Ferguson ND, Ginde AA, Gong MN, Grissom CK, Gundel S, Hayden D, Hite RD, Hou PC, Hough CL, Iwashyna TJ, Khan A, Liu KD, Talmor D, Thompson BT, Ulysse CA, Yealy DM, Angus DC. Early Neuromuscular Blockade in the Acute Respiratory Distress Syndrome. *N Engl J Med.* 2019 May 23;380(21):1997-2008. doi: 10.1056/NEJMoa1901686. Epub 2019 May 19. PMID: 31112383.

197. Wilson JL, Wang L, Zhang Z, **Hill NS**, Polgar P. Participation of PLK1 and FOXM1 in the hyperplastic proliferation of pulmonary artery smooth muscle cells in pulmonary arterial hypertension. *PLoS One.* 2019 Aug 22;14(8):e0221728. doi: 10.1371/journal.pone.0221728. eCollection 2019. PMID: 31437238

198. Burns KEA, Rizvi L, Cook DJ, Seely AJE, Rochwerg B, Lamontagne F, Devlin JW, Dodek P, Mayette M, Tanios M, Gouskos A, Kay P, Mitchell S, Kiedrowski KC, **Hill NS**. Canadian Critical Care Trials Group. Frequency of Screening and SBT Technique Trial - North American Weaning Collaboration (FAST-NAWC): a protocol for a multicenter, factorial randomized trial. *Trials.* 2019 Oct 11;20(1):587. doi: 10.1186/s13063-019-3641-8. *Trials.* 2019 Oct 11;20(1):587 PMID: 31604480

199. National Heart, Lung, and Blood Institute PETAL **Clinical Trials Network**, Ginde AA, Brower RG, Caterino JM, Finck L, Banner-Goodspeed VM, Grissom CK, Hayden D, Hough CL, Hyzy RC, Khan A, Levitt JE, Park PK, Ringwood N, Rivers EP, Self WH, Shapiro NI, Thompson BT, Yealy DM, Talmor D. Early High-Dose Vitamin D₃ for Critically Ill, Vitamin D-Deficient Patients. *N Engl J Med.* 2019 Dec 26;381(26):2529-2540. doi: 10.1056/NEJMoa1911124. Epub 2019 Dec 11. PMID: 31826336.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

200. Preston IR, Burger CD, Bartolome S, Safdar Z, Krowka M, Sood N, Ford HJ, Battarjee WF, Chakinala MM, Gomberg-Maitland M, **Hill NS**. Ambrisentan in portopulmonary hypertension: A multicenter, open-label trial. *J Heart Lung Transplant*. 2020 Jan 21. pii: S1053-2498(20)30011-5. doi: 10.1016/j.healun.2019.12.008. Epub 2020 Jan 21. PMID: 32008947

201. Tang WHW, Wilcox JD, Jacob MS, Rosenzweig EB, Borlaug BA, Frantz RP, Hassoun PM, Hemnes AR, **Hill NS**, Horn EM, Singh HS, Systrom DM, Tedford RJ, Vanderpool RR, Waxman AB, Xiao L, Leopold JA, Rischard FP. Comprehensive Diagnostic Evaluation of Cardiovascular Physiology in Patients With Pulmonary Vascular Disease: Insights From the PVDOMICS Program. *Circ Heart Fail*. 2020 Mar;13(3):e006363. doi: 10.1161/CIRCHEARTFAILURE.119.006363. Epub 2020 Feb 24. PMID: 32088984

202. Stefan MS, Pekow PS, Shea CM, Hughes AM, **Hill NS**, Steingrub JS, Lindenauer PK. Protocol for two-arm pragmatic cluster randomized hybrid implementation-effectiveness trial comparing two education strategies for improving the uptake of noninvasive ventilation in patients with severe COPD exacerbation. *Implement Sci Commun*. 2020;1(1):46. doi: 10.1186/s43058-020-00028-2. Epub 2020 May 6. PMID: 32435762

203. Bhedi CD, Nasirova S, Toksoz D, Warburton RR, Morine KJ, Kapur NK, Galper JB, Preston IR, **Hill NS**, Fanburg BL, Penumatsa KC. Glycolysis regulated transglutaminase 2 activation in cardiopulmonary fibrogenic remodeling. *FASEB J*. 2020 Jan;34(1):930-944. doi: 10.1096/fj.201902155R. Epub 2019 Nov 28. PMID: 31914588

204. Tang WHW, Wilcox JD, Jacob MS, Rosenzweig EB, Borlaug BA, Frantz RP, Hassoun PM, Hemnes AR, **Hill NS**, Horn EM, Singh HS, Systrom DM, Tedford RJ, Vanderpool RR, Waxman AB, Xiao L, Leopold JA, Rischard FP. Comprehensive Diagnostic Evaluation of Cardiovascular Physiology in Patients With Pulmonary Vascular Disease: Insights From the PVDOMICS Program. *Circ Heart Fail*. 2020 Mar;13(3):e006363. doi: 10.1161/CIRCHEARTFAILURE.119.006363. Epub 2020 Feb 24. PMID: 32088984

205. Mathioudakis AG, Sivapalan P, Papi A, Vestbo J; DECODE-NET (DisEntangling Chronic Obstructive pulmonary Disease Exacerbations clinical trials NETwork) Investigators. The DisEntangling Chronic Obstructive pulmonary Disease Exacerbations clinical trials NETwork (DECODE-NET): rationale and vision. *Eur Respir J*. 2020 Jul 2;56(1):2000627. doi: 10.1183/13993003.00627-2020. Print 2020 Jul. PMID: 32616552

206. Pharmacokinetics and tolerability of LIQ861, a novel dry-powder formulation of treprostinil. Original Roscigno R, Vaughn T, Anderson S, Wargin W, Hunt T, **Hill NS**. *Pulm Circ*. 2020 Nov 19;10(4):2045894020971509. doi: 10.1177/2045894020971509. eCollection 2020 Oct-Dec. PMID: 33282202

207. Raoof S, Nava S, Carpati C, **Hill NS**. High-Flow, Noninvasive Ventilation and Awake (Nonintubation) Proning in Patients With Coronavirus Disease 2019 With Respiratory Failure. *Chest*. 2020 Nov;158(5):1992-2002. doi:10.1016/j.chest.2020.07.013. Epub 2020 Jul 15. PMID: 32681847

208. Badlam JB, Badesch DB, Austin ED, Benza RL, Chung WK, Farber HW, Feldkircher K, Frost AE, Poms AD, Lutz KA, Pauciulo MW, Yu C, Nichols WC, Elliott CG; USPHSR Investigators. United States Pulmonary Hypertension Scientific Registry: Baseline Characteristics. *Chest*. 2021 Jan;159(1):311-327. doi: 10.1016/j.chest.2020.07.088. Epub 2020 Aug 26. PMID: 32858008

209. Stefan MS, Priya A, Pekow PS, Steingrub JS, **Hill NS**, Lagu T, Raghunathan K, Bhat AG, Lindenauer PK. A scoring system derived from electronic health records to identify patients at high risk for noninvasive ventilation failure. *BMC Pulm Med*. 2021 Feb 5;21(1):52. doi: 10.1186/s12890-021-01421-w. PMID: 33546651

210. Menon DP, Qi G, Kim SK, Moss ME, Penumatsa KC, Warburton RR, Toksoz D, Wilson J, **Hill NS**, Jaffe IZ, Preston IR. Vascular cell-specific roles of mineralocorticoid receptors in pulmonary hypertension. *Pulm Circ*. 2021 Jun 18;11(3):20458940211025240. doi: 10.1177/20458940211025240. eCollection 2021 Jul-Sep. PMID: 34211700

211. Machnicki S, Patel D, Singh A, Talwar A, Mina B, Oks M, Makkar P, Naidich D, Mehta A, **Hill NS**, Brown KK, Raoof S. The Usefulness of Chest CT Imaging in Patients With Suspected or Diagnosed COVID-19: A Review of Literature. *Chest*. 2021 Aug;160(2):652-670. doi: 10.1016/j.chest.2021.04.004. Epub 2021 Apr 20. PMID: 33861993.

212. **Hill NS**, Criner GJ, Branson RD, Celli BR, MacIntyre NR, Sergew A; ONMAP Technical Expert Panel. Optimal NIV Medicare Access Promotion: Patients With COPD: A Technical Expert Panel Report From the American College of Chest Physicians, the American Association for Respiratory Care, the American Academy of Sleep Medicine, and the American Thoracic Society. *Chest*. 2021 Nov;160(5):e389-e397. doi: 10.1016/j.chest.2021.06.082. Epub 2021 Jul 30. PMID: 34339684

213. Stefan MS, Pekow PS, Shea CM, Hughes AM, **Hill NS**, Steingrub JS, Farmer MJS, Hess DR, Riska KL, Clark TA, Lindenauer PK. Update to the study protocol for an implementation-effectiveness trial comparing two education strategies for improving the uptake of noninvasive ventilation in patients with severe COPD exacerbation. *Trials*. 2021 Dec 16;22(1):926. doi: 10.1186/s13063-021-05855-9. PMID: 34915905.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

214. McCormick JL, Clark TA, Shea CM, Hess DR, Lindenauer PK, **Hill NS**, Allen CE, Farmer MS, Hughes AM, Steingrub JS, Stefan MS. Exploring the Patient Experience with Noninvasive Ventilation: A Human-Centered Design Analysis to Inform Planning for Better Tolerance. *Chronic Obstr Pulm Dis.* 2022 Jan 27;9(1):80-94. doi: 10.15326/jcopdf.2021.0274. PMID: 35018753

215. Rahaghi FF, Balasubramanian VP, Bourge RC, Burger CD, Chakinala MM, Eggert MS, Elwing JM, Feldman J, King C, Klinger JR, Mathai SC, McConnell JW, Palevsky HI, Restrepo-Jaramillo R, Safdar Z, Sager JS, Sood N, Sulica R, White RJ, **Hill NS**. Delphi consensus recommendation for optimization of pulmonary hypertension therapy focusing on switching from a phosphodiesterase 5 inhibitor to riociguat. *Pulm Circ.* 2022 Apr 7;12(2):e12055. doi: 10.1002/pul.212055. eCollection 2022 Apr. PMID: 35514769

216. Penumatsa KC, Singhal AA, Warburton RR, Bear MD, Bhedi CD, Nasirova S, Wilson JL, Qi G, Preston IR, **Hill NS**, Fanburg BL, Kim YB, Toksoz D. Vascular smooth muscle ROCK1 contributes to hypoxia-induced pulmonary hypertension development in mice. *Biochem Biophys Res Commun.* 2022 May 14;604:137-143. doi: 10.1016/j.bbrc.2022.02.064. Epub 2022 Mar 9. PMID: 35303680.

217. **Hill NS**, Feldman JP, Sahay S, Benza RL, Preston IR, Badesch D, Frantz RP, Patel S, Galloway A, Bull TM; INSPIRE study investigators. INSPIRE: Safety and tolerability of inhaled Yutrepla (treprostinil) in pulmonary arterial hypertension (PAH). *Pulm Circ.* 2022 Jul 1;12(3):e12119. doi: 10.1002/pul2.12119. eCollection 2022 Jul. PMID: 36034402.

218. Rice LM, Mantero JC, Stratton EA, Warburton R, Roberts K, **Hill N**, Simms RW, Domsic R, Farber HW, Lafyatis R. Correction: Serum biomarker for diagnostic evaluation of pulmonary arterial hypertension in systemic sclerosis. *Arthritis Res Ther.* 2022 May 23;24(1):118. doi: 10.1186/s13075-022-02816-8. PMID: 35606822 Free PMC article.

219. Hemnes AR, Leopold JA, Radova MK, Beck GJ, Abidov A, Aldred MA, Barnard J, Rosenzweig EB, Borlaug BA, Chung WK, Comhair SAA, Desai AA, Dubrock HM, Erzurum SC, Finet JE, Frantz RP, Garcia JGN, Geraci MW, Gray MP, Grunig G, Hassoun PM, Highland KB, **Hill NS**, Hu B, Kwon DH, Jacob MS, Jellis CL, Larive AB, Lempel JK, Maron BA, Mathai SC, McCarthy K, Mehra R, Nawab R, Newman JH, Olman MA, Park MM, Ramos JA, Renapurkar RD, Rischard FP, Sherer SG, Tang WHW, Thomas JD, Vanderpool RR, Waxman AB, Wilcox JD, Yuan JX, Horn EM; PVDOMICS Study Group. Clinical Characteristics and Transplant-Free Survival Across the Spectrum of Pulmonary Vascular Disease. *J Am Coll Cardiol.* 2022 Aug 16;80(7):697-718. doi: 10.1016/j.jacc.2022.05.038. PMID: 35953136.

220. Tariq A, **Hill NS**, Price LL, Ismail K. Incidence and Nature of Respiratory Events in Patients Undergoing Bronchoscopy Under Conscious Sedation. *J Bronchology Interv Pulmonol.* 2022 Oct 1;29(4):283-289. doi: 10.1097/LBR.0000000000000837. Epub 2022 Mar 14. PMID: 35275851

221. Frantz RP, Leopold JA, Hassoun PM, Hemnes AR, Horn EM, Mathai SC, Rischard FP, Larive AB, Tang WHW, Park MM, **Hill NS**, Rosenzweig EB. Acute vasoreactivity testing during right heart catheterization in chronic thromboembolic pulmonary hypertension: Results from the pulmonary vascular disease phenomics study. *Pulm Circ.* 2023 Jan 6;13(1):e12181. doi: 10.1002/pul2.12181. eCollection 2023 Jan. PMID: 36618713

222. Ramsey ME, Faugno AJ, Puryear WB, Lee BC, Foss AD, Lambert LH, Nargi FE, Bopp GP, Lee LP, Rudzinski CM, Ervin BL, Runstadler JA, **Hill NS**. Characterization of SARS-CoV-2 Aerosols Dispersed During Noninvasive Respiratory Support of Patients With COVID-19. *Respir Care.* 2023 Jan;68(1):8-17. doi: 10.4187/respcare.10340. PMID: 36566031

223. Rischard FP, Bernardo RJ, Vanderpool RR, Kwon DH, Acharya T, Park MM, Katrynuik A, Insel M, Kubba S, Badagliacca R, Larive AB, Naeije R, Garcia JGN, Beck GJ, Erzurum SC, Frantz RP, Hassoun PM, Hemnes AR, **Hill NS**, Horn EM, Leopold JA, Rosenzweig EB, Tang WHW, Wilcox JD. Classification and Predictors of Right Ventricular Functional Recovery in Pulmonary Arterial Hypertension. *medRxiv.* 2023 Feb 16:2023.02.15.23285974. doi: 10.1101/2023.02.15.23285974. Preprint. PMID: 36824981

224. AGillies H, Niven R, Dake BT, Chakinala MM, Feldman JP, **Hill NS**, Hoeper MM, Humbert M, McLaughlin VV, Kankam M. V-101, a novel inhaled dry-powder formulation of imatinib, in healthy adult participants: a phase 1 single and multiple ascending dose study. *ERJ Open Res.* 2023 Mar 13;9(2):00433-2022. doi: 10.1183/23120541.00433-2022. eCollection 2023 Mar. PMID: 36923571

225. Llada IM, Lourenco JM, Dycus MM, Carpenter JM, Suen G, **Hill NS**, Filipov NM. Behavioral and Physiological Alterations in Angus Steers Grazing Endophyte-Infected Toxic Fescue during Late Fall. *Toxins (Basel).* 2023 May 18;15(5):343. doi: 10.3390/toxins15050343. PMID: 37235377

226. Martens P, Yu S, Larive B, Borlaug BA, Erzurum SC, Farha S, Finet JE, Grunig G, Hemnes AR, **Hill NS**, Horn EM, Jacob M, Kwon DH, Park MM, Rischard FP, Rosenzweig EB, Wilcox JD, Tang WHW; PVDOMICS Study Group. Iron deficiency in pulmonary vascular disease: pathophysiological and clinical implications. *Eur Heart J.* 2023 Jun 9;44(22):1979-1991. doi: 10.1093/euroheartj/ehd149. PMID: 36879444

227. Naranjo M, Rosenzweig EB, Hemnes AR, Jacob M, Desai A, **Hill NS**, Larive AB, Finet JE, Leopold J, Horn E, Frantz R, Rischard F, Erzurum S, Beck G, Mathai SC, Hassoun PM; PVDOMICS Study Group. Frequency of acute vasodilator

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

response (AVR) in incident and prevalent patients with pulmonary arterial hypertension: Results from the pulmonary vascular disease phenomics study. *Pulm Circ.* 2023 Aug 21;13(3):e12281. doi: 10.1002/pul2.12281. eCollection 2023 Jul. PMID: 37614830

228. Schweich H, Idrees N, Rideout J, Barnewolt B, Rice L, **Hill NS**. Randomized Controlled Trial Assessing a Vibrating Mesh Nebulizer Compared to a Jet Nebulizer in Severe Asthma Exacerbations. *Respir Care.* 2023 Oct 10:respcare.10980. doi: 10.4187/respcare.10980. Online ahead of print. PMID: 37816543

229. Burns KEA, Lafrienier-Roula M, **Hill NS**, Cook DJ, Seely AJE, Rochwerg B, Mayette M, D'Aragon F, Devlin JW, Dodek P, Tanios M, Gouskos A, Turgeon AF, Aslanian P, Sia YT, Beitel JR, Hyzy R, Criner GJ, Kassis EB, Tsang JLY, Meade MO, Liebler JM, Wong JTY, Thorpe KE; Canadian Critical Care Trials Group. Frequency of screening and SBT Technique Trial-North American Weaning Collaboration (FAST-NAWC): an update to the protocol and statistical analysis plan. *Trials.* 2023 Oct 2;24(1):626. doi: 10.1186/s13063-023-07079-5. PMID: 37784109

230. Rischard FP, Bernardo RJ, Vanderpool RR, Kwon DH, Acharya T, Park MM, Katrynuik A, Insel M, Kubba S, Badagliacca R, Larive AB, Naeije R, Garcia JGN, Beck GJ, Erzurum SC, Frantz RP, Hassoun PM, Hemnes AR, **Hill NS**, Horn EM, Leopold JA, Rosenzweig EB, Tang WHW, Wilcox JD. Classification and Predictors of Right Ventricular Functional Recovery in Pulmonary Arterial Hypertension. *Circ Heart Fail.* 2023 Oct;16(10):e010555. doi: 10.1161/CIRCHEARTFAILURE.123.010555. Epub 2023 Sep 4. PMID: 37664964

231. Lowery MM, **Hill NS**, Wang L, Rosenzweig EB, Bhat A, Erzurum S, Finet JE, Jellis CL, Kaur S, Kwon DH, Nawabit R, Radeva M, Beck GJ, Frantz RP, Hassoun PM, Hemnes AR, Horn EM, Leopold JA, Rischard FP, Mehra R; Pulmonary Vascular Disease Phenomics (PVDOMICS) Study Group. Sleep-Related Hypoxia, Right Ventricular Dysfunction, and Survival in Patients With Group 1 Pulmonary Arterial Hypertension. *J Am Coll Cardiol.* 2023 Nov 21;82(21):1989-2005. doi: 10.1016/j.jacc.2023.09.806. PMID: 37968017

232. Simpson CE, Ambade AS, Harlan R, Roux A, Aja S, Graham D, Shah AA, Hummers LK, Hemnes AR, Leopold JA, Horn EM, Berman-Rosenzweig ES, Grunig G, Aldred MA, Barnard J, Comhair SAA, Tang WHW, Griffiths M, Rischard F, Frantz RP, Erzurum SC, Beck GJ, **Hill NS**, Mathai SC, Hassoun PM, Damico RL; the PVDOMICS Study Group. Kynurenone pathway metabolism evolves with development of preclinical and scleroderma-associated pulmonary arterial hypertension. *Am J Physiol Lung Cell Mol Physiol.* 2023 Nov 1;325(5):L617-L627. doi: 10.1152/ajplung.00177.2023. Epub 2023 Oct 3. PMID: 37786941

233. Gillies H, Chakinala MM, Dake BT, Feldman JP, Hoeper MM, Humbert M, Jing ZC, Langley J, McLaughlin VV, Niven RW, Rosenkranz S, Zhang X, **Hill NS**. IMPAHCT: A randomized phase 2b/3 study of inhaled imatinib for pulmonary arterial hypertension. *Pulm Circ.* 2024 Mar 25;14(1):e12352. doi: 10.1002/pul2.12352. eCollection 2024 Jan. PMID: 38532768

234. Hilling L, Cayou C, Kops RS, Ameo RA, Morishige RJ, Glezer S, **Hill NS**. Effect of a Ventilatory Assist Device in Addition to Supplemental Oxygen on Exercise Endurance in Subjects With COPD. *Respir Care.* 2024 Apr 22;69(5):527-533. doi: 10.4187/respcare.10875. PMID: 38199761

235. Balasubramanian A, Larive AB, Horn EM, DuBrock HM, Mehra R, Jacob MS, Hemnes AR, Leopold JA, Radeva MK, **Hill NS**, Erzurum SC, Rosenzweig EB, Frantz RP, Rischard FP, Beck GJ, Hassoun PM, Mathai SC; PVDOMICS Study Group. Health-Related Quality of Life Across the Spectrum of Pulmonary Hypertension. *Chest.* 2024 Jun;165(6):1493-1504. doi: 10.1016/j.chest.2024.02.009. Epub 2024 Feb 12. PMID: 38354903

236. Moon BF, Zhou IY, Ning Y, Chen YI, Le Fur M, Shuvaev S, Akam EA, Ma H, Solsona CM, Weigand-Whittier J, Rotile N, Hariri LP, Drummond M, Boice AT, Zygmont SE, Sharma Y, Warburton RR, Martin GL, Blanton RM, Fanburg BL, **Hill NS**, Caravan P, Penumatsa KC. Simultaneous Positron Emission Tomography and Molecular Magnetic Resonance Imaging of Cardiopulmonary Fibrosis in a Mouse Model of Left Ventricular Dysfunction. *J Am Heart Assoc.* 2024 Jul 16;13(14):e034363. doi: 10.1161/JAHA.124.034363. Epub 2024 Jul 9. PMID: 38979786

237. Mukherjee M, Mathai SC, Jellis C, Freed BH, Yanek LR, Agoglia H, Chiu C, Jani VP, Simpson CE, Brittain EL, Tang WHW, Park MM, Hemnes AR, Rosenzweig EB, Rischard FP, Frantz RP, Hassoun PM, Beck G, **Hill NS**, Erzurum S, Thomas JD, Kwon D, Leopold JA, Horn EM, Kim J; PVDOMICS Study Group. Defining Echocardiographic Degrees of Right Heart Size and Function in Pulmonary Vascular Disease from the PVDOMICS Study. *Circ Cardiovasc Imaging.* 2024 Oct;17(10):e017074. doi: 10.1161/circimaging.124.017074. Epub 2024 Oct 15. PMID: 39691460

238. Shelburne NJ, Nian H, Beck GJ, Casanova NG, Desai AA, DuBrock HM, Erzurum S, Frantz RP, Hassoun PM, **Hill NS**, Horn EM, Jacob MS, Jellis CL, Joseloff E, Kwon DH, Brett Larive A, Leopold JA, Park MM, Rischard FP, Rosenzweig EB, Vanderpool RR, Yu C, Hemnes AR; Redefining Pulmonary Hypertension Through Pulmonary Vascular Disease Phenomics Study Group. Association of Male Sex With Worse Right Ventricular Function and Survival in Pulmonary Hypertension in the Redefining Pulmonary Hypertension Through Pulmonary Vascular Disease Phenomics Cohort. *CHEST Pulm.* 2024 Sep;2(3):100046. doi:10.1016/j.chpulm.2024.100046. Epub 2024 Mar 11. PMID: 39524046

239. Reddy YNV, Frantz RP, Hassoun PM, Hemnes AR, Horn E, Leopold JA, Rischard F, Rosenzweig EB, **Hill NS**, Erzurum SC, Beck GJ, Finet JE, Jellis CL, Mathai SC, Tang WHW, Borlaug BA. Clinical Implications of Pretest Probability of

HFpEF on Outcomes in Precapillary Pulmonary Hypertension. *J Am Coll Cardiol.* 2024 Nov 26;84(22):2196-2210. doi: 10.1016/j.jacc.2024.08.061. Epub 2024 Oct 23. PMID: 39453363

240. Reddy YNV, Dubrock H, Hassoun PM, Hemnes A, Horn E, Leopold JA, Rischard F, Rosenzweig EB, **Hill NS**, Erzurum SC, Beck GJ, Mathai SC, Mukherjee M, Tang WHW, Borlaug BA, Frantz RP; and the PVDOMICS Study Group. Non-invasive prediction of pulmonary vascular disease-related exercise intolerance and survival in non-group 1 pulmonary hypertension. *Eur J Heart Fail.* 2024 Nov;26(11):2323-2336. doi: 10.1002/ejhf.3396. Epub 2024 Jul 26. PMID: 39058211

BOOK CHAPTERS/REVIEWS

- 1) Rounds S, **Hill NS**, O'Brien RF. Pulmonary vascular reactivity after acute lung injury. Third International Banff Hypoxia Symposium. In: J. Sutton, ed., Alan R. Liss, Houston, 1983.
- 2) **Hill NS**, Rounds S. Pulmonary hypertension: Diagnosis and approach to therapy. In: Brody JS, Snider GL, eds. Current Topics in the Management of Respiratory Diseases. 2nd ed, Vol. II. Churchill-Livingstone, New York, 1985, pp. 31-53.
- 3) Fanburg BL, Deneke SM, Lee SL, **Hill NS**. Mediators of lung injury in oxygen toxicity. Bronchopulmonary dysplasia and related chronic respiratory disorders. In: 90th Ross Conference on Pediatric Research, March, 1985. Ross Laboratories, Columbus, 1986, pp. 16-23.
- 4) **Hill NS**, Rounds S. Pulmonary embolism. In: Nobel J,ed. Primary Care for the Internist. Little Brown and Co.1987.
- 5) **Hill NS**, Fanburg BL. Clinical correlates of endothelial cell dysfunction. In: Rayn U, ed. Pulmonary Endothelium, Lung Biology in Health and Disease. Marcel Dekker, New York 1987.
- 6) **Hill NS**. The cardiac exam in lung disease. In: *Med Clin N.A.* 1987, 8:273-285.
- 7) **Hill NS**. The right ventricle in chronic obstructive pulmonary disease. In: M. Konstam M, Isner J,eds. The Right Ventricle. Martinus-Nijhoff, Norwell, MA, 1988.
- 8) Rondinelli RD, **Hill NS**. Rehabilitation of the patient with pulmonary disease. In: DeLisa JA, ed. Rehabilitation Medicine, Principles and Practice, J.B. Lippincott, Philadelphia, PA, 1988.
- 9) Jayes RL, **Hill NS**, Pauker SG. Open lung biopsy in primary pulmonary hypertension: A decision analysis. In: *Sem Respir Med* 1989, 10:232-241.
- 10) Ou LC, **Hill NS**, Pickett BP, Faulkner CS, Sardella GL, Thron CD, Tenney SM. Hypoxia-induced right ventricular aneurysm. Symposium on Pulmonary Circulation. In: Jezeck V, Morpurgo M, Tramarin R, eds. Current Topics in Rehabilitation: Springer-Verlag, Berlin, 1992.
- 11) **Hill NS**, Weiss EB. Status asthmaticus. In: Weiss EB, ed. Bronchial Asthma: mechanisms and therapeutics. 3rd Edition. Little Brown and Co., Boston 1993.
- 12) **Hill NS**. Noninvasive ventilation. "Does it work, for whom, and how?" In: *Am Rev Respir Dis* 1993, 147:1050-1055.
- 13) **Hill NS**, Meyer TJ. Noninvasive positive pressure ventilation. Pulmonary and Critical Care Update: In: American College of Chest Physicians 1994.
- 14) Unterborn J, **Hill NS**. Options for mechanical ventilation in neuromuscular diseases: In: *Clin Chest Med* 1994, 15:765-781.
- 15) **Hill NS**. Noninvasive nasal positive pressure ventilation: Management and Monitoring. In: Robert D, Make BJ, Leger P, Goldberg AI, Paulus J, Willig TN, eds. In: Home Mechanical Ventilation: Arnette-Blackwell, Paris 1995.
- 16) **Hill NS**. Perithoracic ventilation. In: Muir JR, Robert D, eds. In: Ventilation Noninvasive Masson, Paris, 1996.
- 17) **Hill NS**. Failure to wean: the chronic ventilator-dependent patient. In: Fishman AP, ed Pulmonary Rehabilitation: The Series Lung Biology in Health and Disease, Lenfant C, ed. Marcel-Dekker, Inc., New York, 1996.
- 18) **Hill NS**. Noninvasive positive pressure ventilation. In: Current Topics in Intensive Care, Dellinger RP, ed.: WB Saunders Ltd., London, 1996.
- 19) Mehta S, **Hill NS**. Noninvasive ventilation in acute respiratory failure. In: *Respir Care Clin NA* 1996, 2:267-292.
- 20) **Hill NS**. "Use of noninvasive nocturnal ventilatory support on neuromuscular and chest wall disorders: Practical aspects" and Kramer NR, Millman RP, and Hill NS, "Assessment of sleep-disordered breathing in patients with neuromuscular and chest wall disorders". In: Up To Date in Pulmonary and Critical Care Medicine, edited by Postgraduate Education Committee: In: American Thoracic Society, New York, 1997.
- 21) **Hill NS**. Noninvasive mechanical ventilation. In: Pulmonary and Critical Care Medicine, Update #4. Bone RC, Dantzker DR, George RB, Matthay RA, Reynolds HY, eds. Mosby-Year Book, Inc. Chicago, 1996.
- 22) Mehta S, **Hill NS**. Noninvasive ventilation. In: Pulmonary and Respiratory Therapy Secrets. Parsons, PE, Heffner JE, eds. Hanley and Belfus, Inc. In: Medical Publishers, 1996.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

23) Kramer NR, **Hill NS**, Millman RP. Assessment and treatment of sleep pathology in patients with neuromuscular and chest wall disease. In: Clin Pulm Med 1996.

24) Bach JR, Broguher P, Hess DR, **Hill NS**, et al. Consensus Conference: Noninvasive positive pressure ventilation. In: Respir Care 1997, 42:364-369.

25) Wunderink RG, **Hill NS**. Continuous periodic application of noninvasive ventilation in respiratory failure. In: Respir Care 1997, 42: 394-408.

26) **Hill NS**. Complications of noninvasive mask ventilation. In: Respir Care 1997; 42:432-42.

27) **Hill NS**. Noninvasive ventilation for COPD. RT. In: The Journal for Respir Care Practitioners. Sept. 1997.

28) **Hill NS**. Noninvasive ventilation. In: Pulmonary Perspectives 1997; 14:1-4.

29) **Hill NS**. Chronic respiratory failure and noninvasive ventilation. In: Baum G, Crapo J, Celli B, Karlinsky J, eds. Textbook of Pulmonary Diseases, 6th Edition. Little, Brown, Boston, 1998, pp 969-986.

30) Donado JR, **Hill NS**. COPD: Out-patient management in chronic obstructive pulmonary disease. In: Respir Care Clin of N Am 1998, 3: 391-423.

31) Make BJ, **Hill NS**, Goldberg AI, et al. Mechanical ventilation beyond the Intensive Care Unit. Report of a consensus conference of the American College of Chest Physicians. In: Chest 1998; 113:289S-344S.

32) Klinger JR, Warburton R, Pietras L, Smithies O, Swift R and **Hill NS**. Exaggerated pulmonary hypertensive responses during chronic hypoxia in mice with gene-targeted reductions in atrial natriuretic peptide. In: Chest 1998; 114: 79S-80S.

33) **Hill NS**, Braman S. Noninvasive Ventilation for Neuromuscular Disease. In: Cherniack NS, Homma I, Altose M, eds. Rehabilitation of the Patient with Respiratory Disease: McGraw-Hill, 1998.

34) **Hill NS**. Noninvasive mechanical ventilation. In: Albert RK, Spiro H, Jett J, eds. Comprehensive Respiratory Medicine: Mosby, London 1999.

35) **Hill NS**. Home noninvasive ventilation for patients with lung disease. In: Bach JR, ed. Noninvasive Mechanical Ventilation: Hanley and Belfus, Philadelphia (in press). Clinical indications for noninvasive positive pressure ventilation in chronic respiratory failure due to restrictive lung disease, COPD, and nocturnal hypoventilation – A Consensus Conference. ACCP NAMDRC Consensus Group (Hill N, member). In: Chest, 1999; 116:521-34.

36) **Hill NS**. Current concepts in mechanical ventilation for chronic obstructive pulmonary disease. In: Semin Respir Crit Care Med 1999; 20:375-93.

37) **Hill, NS**. Noninvasive positive pressure ventilation for acute respiratory failure. In: Braunwald E, ed. Harrison's On-line: McGraw-Hill, New York, NY, 1999.

38) **Hill NS**. Noninvasive ventilation in chronic obstructive pulmonary disease. In: Clin Chest Med 2000; 21:783-97.

39) **Hill NS**. A 69 yo woman with COPD and increasing cough and dyspnea. In: Heffner JE, Sahn SA, eds. Internal Med Pearls: Hanley and Belfus, Inc. Philadelphia, PA, 2001:208-18.

40) **Hill NS**. Using NPPV to optimal benefit in acute respiratory failure. In: J Crit Illness 2001; 16:361-66.

41) **Hill NS**. NPPV for acute respiratory failure: Tips on technique. In: J Crit Illness 2011; 16:409-12.

42) Kacmarek R., **Hill NS**. Ventilators for noninvasive positive pressure ventilation: Technical aspects - Noninvasive Mechanical Ventilation. In: Muir JR, Simonds A, Ambrosino N, eds. European Respiratory Monograph Series, A Rossi, ed.in chief, Sheffield, UK, 2001.

43) **Hill NS**, Noninvasive ventilation in the post-acute setting. In: Clin Chest Med 2001; 22:35-54.

44) Magno-Russo P, **Hill NS**. New approaches to pulmonary hypertension. In: Hospital Practice 2001; 36:29-40.

45) Donat WE, **Hill NS**. Sites of care for long-term mechanical ventilation. In: Hill NS, ed. Long Term Mechanical Ventilation. Marcel Dekker, New York 2011:19-38.

46) Leger P, **Hill NS**. Long-term mechanical ventilation for restrictive thoracic disease. In: Hill NS, ed. Long Term Mechanical Ventilation. Marcel Dekker, New York 2001; 105-50.

47) **Hill NS**. Management of long-term noninvasive ventilation. In: Hill NS, ed. Long Term Mechanical Ventilation. Marcel Dekker, New York 2011:253-304.

48) **Hill NS**. Ventilator management for neuromuscular disease. In: Sem Resp Crit Care Med 2002; 23:293-305.

49) Ward NS, **Hill NS**. Pulmonary function testing in neuromuscular disease. In: Clin Chest Med 2001; 22:769-81.

50) **Hill NS**, Liesching T, Kwok H. Indications for Noninvasive Ventilation. In: Slutsky AS, Brochard L, eds. Mechanical Ventilation: Springer, Berlin, 2003.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

51) Preston I, **Hill NS**. Evaluation and management of pulmonary hypertension in scleroderma. In: Curr Opin Rheum 2003;15.

52) Karemsetty MR, Leiter JC, Ou LC, Preston IR, **Hill NS**. Stain differences of hypoxia-induced pulmonary hypertension. In: Yuan JX-J, ed. Hypoxia Pulmonary Asoconstriction Cellular and Molecular Mechanisms: Springer-Verlag. New York. 2003.

53) **Hill NS**. Noninvasive Ventilation for COPD. Respir Care 2004;49:72-85.

54) Maheshwari V, **Hill NS**. Noninvasive ventilation for chronic obstructive pulmonary disease. Respir Care 2004; Jan: 49(1): 72-87.

55) Thompson BT, Cox PN, Antonelli M, Carlet JM, Cassell J, **Hill NS**, Hinds CJ, Pimentel JM, Reinhart K, Thijs LG, American Thoracic Society, European Respiratory Socitey, European Socitey of Intensive Care Medicine, Society of Critical Care Medicine, Societede Reanimation de Langue Francaise. Challenges in end-of-life care in the ICU: Statement of the 5th International Consensus Conference in Critical Care: Brussels, Belgium, April, 2003, executive summary.

56) **Hill NS**. "Noninvasive Mechanical Ventilation". In: Albert RK, Spiro SG, Jett RJ eds. Clinical Respiratory Medicine. 2nd Edition: Mosby Philadelphia, PA 2004.

57) **Hill NS**. "Chronic Respiratory failure and Noninvasive Ventilation". In: Crapo JD, Glassroth J, Karlinsky J, King TE, eds. Baum's Textbook of Pulmonary Diseases, 7th edition: Lippincott Williams & Wilkens, Philadelphia, PA. 2004.

58) Majid A, **Hill NS**. Noninvasive ventilation for acute respiratory failure. In: Curr Opin Crit Care, 2005 Feb;11(1):77-81.

59) Carlet J, Thijs LG, Antonelli M, Cassell J, Cox P, **Hill N**, Hinds C, Pimentel JM, Reinhart K, Thompson BT. Challenges in end-of-life care in the ICU. Statement of the 5th International Consensus Conference in Critical Care: Brussels, Belgium, April 2003. Intensive Care Med 2004 May; 30(5):770-84.

60) Steiner MK, Preston IR, Klinger JR, **Hill NS**. Pulmonary hypertension: Inhaled nitric oxide, sildenafil and natriuretic peptides. In: Curr Opin Pharmacol 2005, June; 5(3):245-250.

61) Perrin C, D'Ambrosio C, White A, **Hill NS**. Sleep in restrictive and neuromuscular respiratory disorders. In: Semin Respir Crit Care Med 2005 Feb; 26(1): 117-130.

62) Pierson DJ, **Hill NS**. "Acute Ventilatory Failure". In: Mason RJ, Broaddus VC, Murray JF, Nadel JA, eds. Murray and Nadel's Textbook of Respiratory Medicine. 4th ed: Elsevier Saunders Philadelphia, PA 2005.

63) Rajan T, **Hill NS**. "Noninvasive Positive Pressure Ventilation". In: Fink MP, Abraham E, Vincent J-L, Kochanek PM,eds. Textbook of Critical Care Medicine 5Th ed: Elsevier Saunders Philadelphia, PA 2005.

64) **Hill NS**. "Noninvasive Mechanical Ventilation" and "Rocking Beds and Other Respiratory Aids". In: Tobin. MR, ed. Principles of Mechanical Ventilation. 2nd Edition: Elsevier Saunders, Inc., Philadelphia, PA 2006.

65) Klinger JR, Houtchens J, Thaker S, **Hill NS**, Farber H. Acute cardiopulmonary hemodynamic effects of brain natriuretic peptide in patients with pulmonary arterial hypertension. Chest. 2005 Dec; 128(6 Suppl):618S-619S.

66) **Hill NS**. Pulmonary Rehabilitation. In: Proc Am Thorac Soc. 2006; 3(1):66-74.

67) **Hill NS**. Neuromuscular disease in respiratory and critical care medicine. In: Respir Care. 2006 Sep;51(9):1065-71.

68) Maheshwari V, **Hill NS**. Emergency applications of noninvasive ventilation. In: Fein A, Kamholz S, Ost D, ed. Respiratory Emergencies: Hodder Arnold, London, 2006.

69) Perrin C, D'Ambrosio C, White A, Garpestad E, **Hill NS**. Restrictive and neuromuscular Disorders. Sleep. In: Lee-Chiong TL, ed. A Comprehensive Handbook:Wiley-Liss, Hoboken, NJ 2006.

70) **Hill NS**. Q&A: Noninvasive ventilation for COPD. In: J Respir Dis 2006; 27:504.

71) **Hill NS**. Noninvasive Methods of Ventilator Support. In: Principles Practice of Mechanical Ventilation/ ed, M J Tobin- 2nd ed., McGraw-Hill Inc., 2006. pp421- 432.

72) **Hill NS**, Perrin C, D'Ambrosio C, White A, Garpestad E. Restrictive Thoracic and Neuromuscular Disorder. In: Sleep: A Comp Handbook. John Wiley & Son 2006.

73) Ozsancak A, D'Ambrosio C, Garpestad E, Schumaker G, **Hill NS**. Sleep and mechanical ventilation. In: Crit Care Clin 2008 Jul; 24(3):517-31, vi-vii.

74) **Hill NS**, Farber HW, eds. Pulmonary Hypertension. In: Contemporary Cardiology, Cannon C, series editor. Humana Press. New York 2008.

75) **Hill NS**, Preston IR, Roberts KE. "Patients with pulmonary arterial hypertension in clinical trials: who are they?" In: Proc Am Thorac Soc. 2008 Jul 15; 5(5):603-9.

76) **Hill NS**. Noninvasive Mechanical Ventilaton Mac. In: NR, Branson RD eds. Mechanical Ventilation. 2nd Ed.: Saunders St Louis, MO., 2009 pp 366-391.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

77) **Hill NS.** Where Should Noninvasive Ventilation Be Delivered? In: *Respir Care*. 2009 Jan; 54(1):62-70.

78) **Hill NS**, Roberts KR, Preston IR. Postoperative pulmonary hypertension: etiology and treatment of a dangerous complication. In: *Respir Care*. 2009 Jul; 54(7):958-68.

79) **Hill NS.** Acute Ventilatory Failure. In: I&II.RJ Mason, ed., *Murray & Nadel's Textbook of Resp Med* 5th ed.Vol: Saunders North Am 2010.

80) Brennan J, Garpestad E, **Hill NS.** What Is The Role Of Noninvasive Ventilation In The Intensive Care Unit? In: *Evidence-Based Practice of Critical Care*, edited by Drs. Deutschman CS, and Neligan PJ. Elsevier Health Sciences, Philadelphia. 2010

81) Rajan T, **Hill NS.** "Noninvasive Positive-Pressure Ventilation". In: Vincent JL, Abraham E, Kochanek P, Moore F, Fink M. *Textbook of Critical Care* 6th Ed.: Elsevier Saunders Philadelphia, PA. 2011 Jun. pp347-353.

82) Kahn JM, **Hill NS**, Lilly CM, Angus DC, Jacobi J, Rubenfeld GD, Rothschild JM, Sales AE, Scales DC, Mathers JA. The research agenda in ICU telemedicine: a statement from the Critical Care Societies Collaborative. In: *Chest*. 2011 Jul; 140(1):230-8.

83) **Hill NS**, Stroller J. Respiratory Monitoring in Critical Care. In: Goldman L, Schafer A, eds, *Goldman's Cecil Medicine* 24th ed. Philadelphia: Elsevier Saunders 2012; 103:626-29.

84) **Hill NS**, Sidhom S. Mechanical Ventilation Part II: Non-invasive Mechanical ventilation for the Adult Hospitalized Patient. In: Irwin RS, Rippe JM, eds, *Intensive Care Medicine* 7th ed. Philadelphia: LWW 2011. 59:641-58.

85) **Hill NS.** Noninvasive Respiratory Aids: Rocking Bed, Pneumobelt, and Glossopharyngeal Breathing. In: *Principles and Practice of Mechanical Ventilation*, 3rd edition. ed., Martin J. Tobin. McGraw-Hill, Philadelphia, PA 2013. pp 435-445.

86) **Hill NS.** Noninvasive Positive-Pressure Ventilation. In: *Principles and Practice of Mechanical Ventilation*, 3rd edition. ed., Martin J. Tobin. McGraw-Hill, Philadelphia, PA 2013..pp 447-491.

87) Stoller J, **Hill NS.** Respiratory Monitoring in Critical Care. In *Cecil-Goldman Medicine*. 25th edition. New York. 2015.

88) Mirrakhimov AE, **Hill NS.** Primary antiphospholipid syndrome and pulmonary hypertension. *Curr Pharm Des*. 2014; 20(4):545-51.

89) **Hill NS.** Acute Ventilatory Failure. In *Murray & Nadel's Textbook of Respiratory Medicine*, 2-Volume Set, 6th Edition. Saunders, North Am. 2015

90) Yu F, Garpestad E, **Hill NS.** What Is The Role Of Noninvasive Ventilation In The Intensive Care Unit? In: *Evidence-Based Practice of Critical Care*, 2nd Edition. Edited by Drs. Deutschman CS, and Neligan PJ. Elsevier Health Sciences, Philadelphia. 2015.

91) **Hill NS**, Badesch D, Benza RL, D'Eletto TA, Farber HW, Gomberg-Maitland M, Hassoun PM, Preston I. Perspectives on oral pulmonary hypertension therapies recently approved by the U.S. Food and Drug Administration. *Ann Am Thorac Soc*. 2015 Feb;12(2):269-73. doi: 10.1513/AnnalsATS.201501-020AS. PMID: 25590376.

92) **Hill NS**, Preston IR, Roberts KE. Inhaled Therapies for Pulmonary Hypertension. *Respir Care*. 2015 Jun;60(6):794-802; discussion 802-5. doi: 10.4187/respcare.03927. Review. PMID: 26070575.

93) **Hill NS**, Badesch D, Benza RL, D'Eletto TA, Farber HW, Gomberg-Maitland M, Hassoun PM, Preston I. Reply: Perspectives on Oral Pulmonary Hypertension Therapies Recently Approved by the U.S. Food and Drug Administration. *Ann Am Thorac Soc*. 2015 Jun; 12(6):960. PMID: 26075562

94) **Hill NS**, Roberts K, Preston I. Pulmonary hypertension trials: how can we do better? *Expert Rev Respir Med*. 2015 Oct;9(5):551-8. doi: 10.1586/17476348.2015.1074040. PMID: 26290120.

95) **Hill NS.** Acute Ventilatory Failure. In: *Murray & Nadel's Textbook of Respiratory Medicine*, 2-Volume Set, 6th Edition. Edited by Drs VC Broaddus, RJ Mason, J Ernst, TE King, Jr, SC. Lazarus, JF Murray, DSc(Hon), FRCP, JA Nadel,, DSc(Hon), DLaw(Hon), A Slutsky, and M Gotway. Elsevier Inc 2016. Chapter 99, 1723-1739.

96) **Hill NS**, Cawley MJ, Heggen-Peay CL. New Therapeutic Paradigms and Guidelines in the Management of Pulmonary Arterial Hypertension. *J Manag Care Spec Pharm*. 2016 Mar;22(3 Suppl A):S3-21. doi: 10.18553/jmcp.2016.22.3-a.s3. Review. PMID: 27003666.

97) Spoletini G, **Hill NS.** High-flow nasal oxygen versus noninvasive ventilation for hypoxemic respiratory failure: Do we know enough? *Ann Thorac Med*. 2016 Jul-Sep;11(3):163-6. doi: 10.4103/1817-1737.185760. PMID: 27512504.

98) Yu F, **Hill NS.** "Noninvasive Positive-Pressure Ventilation". In: Vincent JL, Abraham E, Kochanek P, Moore F, Fink M. *Textbook of Critical Care* 7th Ed.: Elsevier Saunders Philadelphia, PA. 2017 Jun. Ch 62. ISBN: 9780323376389.

99) Sidhom S, **Hill NS.** "Mechanical Ventilation Part II: Non-invasive Mechanical Ventilation for the Adult Hospitalized Patient". In: Drs Irwin RS, Rippe JM. *Textbook Irwin and Rippe's Intensive Care Medicine* 8th Ed. Lippincott Williams & Wilkins. Philadelphia, 2017.

CURRICULUM VITAE 2025

100) **Hill NS**, Spoletini G, Schumaker G, Garpestad E. Noninvasive Ventilatory Support for Acute Hypercapnic Respiratory Failure. *Respir Care*. 2019 Jun;64(6):647-657. doi: 10.4187/respcare.06931. PMID: 31110034

101) Hernández G, **Hill NS**. How to prevent postextubation respiratory failure. *Curr Opin Crit Care*. 2025 Feb 1;31(1):93-100.doi:10.1097/MCC.00000000000001230. Epub 2024 Nov 4.PMID: 39526695 Review.

102) Raveling T, Vonk JM, **Hill NS**, Gay PC, Casanova C, Clin E, Köhnlein T, Márquez-Martin E, Schneeberger T, Murphy PB, Struik FM, Kerstjens HAM, Duiverman ML, Wijkstra PJ. Home noninvasive ventilation in severe COPD: in whom does it work and how? *ERJ Open Res*. 2024 Feb 12;10(1):00600-2023. doi: 10.1183/23120541.00600-2023. eCollection 2024 Jan. PMID: 38348241

103) Farmer MJS, Callahan CD, Hughes AM, Riska KL, **Hill NS**. Developing an Evidence-Based Interprofessional Algorithm to Apply Noninvasive Ventilation in Acute Exacerbation of COPD. *CHEST Pulm*. 2024 Sep;2(3):100067. doi: 10.1016/j.chpulm.2024.100067. Epub 2024 May 31. PMID: 39575446

EDITORIALS & COMMENTARIES

1. **Hill NS**. Use of the rocking bed, pneumobelt, and other noninvasive aids to ventilation. In *Principles and Practice of Mechanical Ventilation*, Tobin MJ, ed., McGraw-Hill 1994.
2. **Hill NS**. Negative pressure ventilation for the facilitation of weaning from mechanical ventilation: back to the future? (Editorial) *Respiratory Care* 1994, 39:19-20.
3. **Hill NS**. Noninvasive positive pressure ventilation in neuromuscular disease. Enough is enough!: In: (editorial) *Chest* 1994, 105:337-338.
4. **Hill NS**. Noninvasive ventilation for the long-term. (Editorial) *Thorax* 1995, 50:595-596.
5. **Hill NS**. The invasion of noninvasive ventilation: Demographic trends in the use of mechanical ventilation. (Editorial) *Respir Care* (in press).
6. **Hill NS**, Noninvasive ventilation has been shown to be ineffective in stable COPD (Pro-Con Editorial) *Am J Respir Crit Care Med* 2000, 161: 689-691.
7. **Hill NS**. Complications of noninvasive ventilation (editorial). *Respir Care* 2000, 45: 480-481.
8. **Hill NS**. Noninvasive ventilation for immunocompromised patients. (Editorial) *N Engl J Med* 2001, 344: 522-524.
9. **Hill NS**. Noninvasive ventilation routine therapy for community acquired pneumonia? Not so fast! (Editorial) *Intensive Care Med* 2001, 27: 797-799.
10. **Hill NS**. Following protocol. Weaning difficult-to-wean patients with chronic obstructive pulmonary disease. (Editorial) *Am J Respir Crit Care Med* 2001 (in press).
11. **Hill NS**. Saving Face: Better Interfaces for Noninvasive Ventilation. In *Intensive Care Medicine* 2002; 28:227-229.
12. Reiss TF, Moss J, Osborne M, Curtis JR, **Hill NS**. Collaborative science and the American Thoracic Society: cooperation in harmony with conflict of interest. *Am J Respir Crit Care Med*. 2012 Feb 15; 185(4):347-9.
13. **Hill NS**. Practice guidelines for noninvasive positive-pressure ventilation: help or hindrance? *Chest*. 2003; 123:1784-6.
14. **Hill N**. What mask for noninvasive ventilation: is deadspace an issue? *Crit Care Med*. 2003 Aug; 31(8):2247-8.
15. **Hill NS**. Noninvasive ventilation for respiratory failure caused by exacerbations of COPD. A standard of care? *Crit Care* 2003; 7:400-401.
16. **Hill NS**. Is there a negative side to noninvasive ventilation? *Eur Respir J* 2004; 23:361-362.
17. **Hill NS**. Editorial: Assistance ventilatoire mecanique a domicile, l 'experience americanize. *Rev Med Respir* 2004;21:1-4.
18. D'Ambrosio C, **Hill NS**. A Less expensive way to diagnose OSA. Does it pay? *Chronic Respir Dis*. In press.
19. **Hill NS**: Noninvasive interfaces: should we go to helmets? *Crit Care Med*. 2004, Oct.:32(10):2163-2163.
20. **Hill NS**. Brain natriuretic peptide: Is it helpful in detecting pulmonary hypertension in fibrotic lung disease? *Am J Respir Crit Care Med* 2004 Aug; 170(4): 352-353.
21. Schumaker GL, **Hill NS**, Garpestad E, Teres D. A looming crisis in demand for intensive care unit resources? *Crit Care Med* 2005 Mar; 33(3): 683-684.
22. Garpestad E, **Hill N**. Noninvasive ventilation for acute respiratory failure: but how severe? *Chest*. 2005 Dec;128(6):3790-1
23. Schumaker G, **Hill NS**. Utilization of critical care resources is increasing--are we ready? *J Intensive Care Med*. 2006 May-Jun; 21(3):191-3.
24. Garpestad E, **Hill NS**. Noninvasive ventilation for acute lung injury: how often should we try, how often should we fail?: *Crit Care*. 2006; 10(4):147.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

25. Roberts K, Preston I, **Hill NS**. Pulmonary hypertension trials: current end points are flawed, but what are the alternatives?: Chest. 2006 Oct; 130(4):934-6.

26. Garpestad E, Schumaker G, **Hill NS**. Noninvasive ventilation for acute respiratory distress syndrome: breaking down the final frontier? Crit Care Med. 2007 Jan; 35(1):288-90.

27. **Hill NS**, Klinger JR. Pulmonary hypertension in the intensive care unit: Critical role of the right ventricle: Crit Care Med. 2007 Sep; 35(9):2210-1.

28. Shapiro S, **Hill NS**. Transition from IV to subcutaneous prostacyclin: premature withdrawal? Chest. 2007 Sep; 132(3):741-3.

29. **Hill NS**, Preston IR, Roberts KE. Inoperable chronic thromboembolic pulmonary hypertension: treatable with medical therapy: Chest. 2008 Aug; 134(2):221-3.

30. **Hill NS**. Noninvasive ventilation for COPD: volume assurance not very reassuring. COPD. 2010 Dec; 7(6):389-90.

31. **Hill NS**, Roberts K, Preston I. Pulmonary vasculopathy in acute respiratory distress syndrome: something new, something old. Am J Respir Crit Care Med. 2010 Nov 1; 182(9):1093-4.

32. **Hill NS**. Noninvasive ventilation for COPD: volume assurance not very reassuring. COPD. 2010 Dec; 7(6):389-90.

33. **Hill NS**, Preston I, Roberts K. Defining the phenotypes for pulmonary hypertension associated with diastolic heart failure. Circ Heart Fail. 2011 May; 4(3):238-40.

34. Manley C, Garpestad E, **Hill NS**. A new purpose for PAV? Crit Care Med. 2013 Jan (In Press).

35. **Hill NS**, Schraufnagel D, Curtis JR. Why PATS to ANNALSATS? Ann Am Thorac Soc. 2013 Feb; 10(1):53.

36. Manley C, Garpestad E, **Hill NS**. A new purpose for proportional assist ventilation? Crit Care Med. 2013 Sep; 41(9):2230-1.

37. Ghalmoush M, **Hill NS**. Synchronized intermittent mandatory ventilation: time to send this workhorse out to pasture. Respir Care. 2013 Nov; 58(11):1992-4. doi: 10.4187/respcare.02880.

38. Angus DC, Deutschman CS, Hall JB, Wilson KC, Munro CL, **Hill NS**. Choosing wisely (®) in critical care: maximizing value in the intensive care unit. Am J Crit Care. 2014 Nov; 23(6):444-6. PMID: 25362666.

39. Rochwerg B, Freitag A, **Hill NS**. New data on noninvasive ventilation in stable chronic obstructive pulmonary disease: revolutionary or evolutionary? Pol Arch Med Wewn. 2015; 125(1-2):5-7. PMID: 25728868.

40. Conti G, **Hill NS**, Nava S. Is sedation safe and beneficial in patients receiving NIV? No. Intensive Care Med. 2015 Sep; 41(9):1692-5. doi: 10.1007/s00134-015-3915-x. PMID: 26149298.

41. Spoletini G, Garpestad E, **Hill NS**. High-Flow Nasal Oxygen or Noninvasive Ventilation for Postextubation Hypoxemia: Flow vs Pressure? JAMA. 2016 Apr 5; 315(13):1340-2. doi: 10.1001/jama.2016.2709. PMID: 26976699.

42. Demoule A, **Hill N**, Navalesi P. Can we prevent intubation in patients with ARDS? Intensive Care Med. 2016 May; 42(5):768-771. doi: 10.1007/s00134-016-4323-6. Epub 2016 Mar 23. Review. No abstract available. PMID: 27007110

43. **Hill NS**, Garpestad E. The Bumpy Road for Noninvasive Ventilation in Acute Respiratory Distress Syndrome. Coming to an End? Am J Respir Crit Care Med. 2017 Jan 1; 195(1):9-10. doi: 10.1164/rccm.201610-2138ED. PMID: 28035848

44. **Hill NS**, Ugurlu AO. Home Noninvasive Ventilation to Reduce Readmissions for Chronic Obstructive Pulmonary Disease. JAMA. 2017 Jun 6; 317(21):2167-2169. doi: 10.1001/jama.2017.5226. No abstract available. PMID: 28528346

45. Burns KEA, Devlin JW, **Hill NS**. Patient and Family Engagement in Designing and Implementing a Weaning Trial: A Novel Research Paradigm in Critical Care. Chest. 2017 Oct; 152(4):707-711. doi: 10.1016/j.chest.2017.06.028. Epub 2017 Jul 4. Review. PMID: 28687380

46. **Hill NS**. Does Noninvasive Ventilation Have a Role in Severe COPD? Tanaffos. 2017; 16(Suppl 1):S11. No abstract available. PMID: 29158750.

47. **Hill NS**, Garpestad E, Schumaker G, Spoletini G. Noninvasive Ventilation for Acute Hypoxic Respiratory Failure/ARDS - is There a Role? Turk J Anaesthesiol Reanim. 2017 Dec; 45(6):332-334. doi: 10.5152/TJAR.2017.24.11.03. Epub 2017 Dec 1. No abstract available. PMID: 29359071.

48. **Hill NS**, Gillespie MN, McMurtry IF. Fifty Years of Monocrotaline-Induced Pulmonary Hypertension: What Has It Meant to the Field? Chest. 2017 Dec; 152(6):1106-1108. doi: 10.1016/j.chest.2017.10.007. No abstract available. PMID: 29223258.

49. **Hill NS**, Garpestad E, Schumaker G, Spoletini G. Judicious Use of Noninvasive Ventilatory Modalities for Severe Pneumonia/ARDS. Turk J Anaesthesiol Reanim. 2018 Feb; 46(1):3-4. doi: 10.5152/TJAR.2018.130202. Epub 2018 Feb 1. No abstract available. PMID: 30140494

50. **Hill NS**, Ruthazer R. Predicting Outcomes of High Flow Nasal Cannula for ARDS: An Index that ROX. Am J Respir Crit Care Med. 2019 Jan 29. doi: 10.1164/rccm.201901-0079ED. PMID: 30694696

CURRICULUM VITAE 2025

51. Penumatsa KC, Warburton RR, **Hill NS**, Fanburg BL. CrossTalk proposal: The mouse SuHx model is a good model of pulmonary arterial hypertension. *J Physiol.* 2019 Feb;597(4):975-977. doi: 10.1113/JP275864. Epub 2018 Nov 29. No abstract available. PMID: 30499212
52. **Hill NS**, Farber HW, Preston IR. An Event-driven Trial for Oral Treprostinil. Progress but Not the Holy Grail. (Editorial) *Am J Respir Crit Care Med.* 2020 Mar 15;201(6):647-649. doi: 10.1164/rccm.201912-2431ED. PMID: 31904994
53. **Hill NS**. No place like home: initiation of non-invasive ventilation for stable severe COPD. *Thorax.* 2020 Mar;75(3):196-197. doi: 10.1136/thoraxjnl-2019-213787. Epub 2020 Jan 29. PMID: 31996402
54. Elliott CG, **Hill NS**. One for the Ages. *Chest.* 2020 Sep;158(3):856-857. doi: 10.1016/j.chest.2020.04.002. PMID: 32892881
55. **Hill NS**, Devaraj A. Noninvasive Ventilation Strategies in the Age of COVID-19: An Evolving Story. *Editorial Respir Care.* 2021 May;66(5):878-880. doi: 10.4187/respcare.09161. PMID: 33931518
56. Devaraj A, Ahmed A, **Hill NS**. Treating Failure of Noninvasive Ventilation for Acute Respiratory Failure Due to COPD: Sooner the Better. *Respir Care.* 2022 Dec;67(12):1642-1643. doi: 10.4187/respcare.10679. PMID: 36442986
57. **Hill NS**. In persistent dyspnea after COVID-19 ARDS, exercise training rehabilitation vs. usual PT reduced dyspnea at 90 d. *Ann Intern Med.* 2023 Oct;176(10):JC117. doi: 10.7326/J23-0073. Epub 2023 Oct 3. PMID: 37782920 Clinical Trial.
58. **Hill NS**. In acute hypoxic respiratory failure, noninvasive oxygenation methods may reduce death vs. standard oxygen therapy. *Ann Intern Med.* 2024 Feb;177(2):JC18. doi: 10.7326/J23-0119. Epub 2024 Feb 6. PMID: 38316005

BOOKS/VOLUMES EDITED OR AUTHORED

- 1) **Hill NS**, Bach JR, eds. Noninvasive Mechanical Ventilation. In: *Respir Care Clin NA*, Volume 2, 1996.
- 2) **Hill NS**. ed. Long-term Mechanical Ventilation. In: *Lung Biology in Health and Disease*, Claude L'Enfant, ed. Marcel Dekker, Inc. New York, 2001.
- 3) **Hill NS**, Levy M., eds., Ventilator Management Strategies of Critical Care. In: *Lung Biology in Health and Disease*, Claude L'Enfant, ed., Marcel Dekker, Inc. New York, 2001
- 4) **Hill NS**. ed. Respiratory Complications of Neuromuscular Disease. In: *Sem Resp Crit Care Med*, Lynch JP, series ed.2002, vol 23.
- 5) **Hill NS**, Noninvasive Positive-Pressure Ventilation. In: *Textbook of Critical Care* 5th ed., MP Fink ed. Saunders, Philadelphia, PA 2005. pp. 519-526.
- 6) **Hill NS**. Pulmonary Hypertension Therapy. In: *Summit Pub*, New York, 2006.
- 7) **Hill NS**, Farber HW, eds. *Pulmonary Hypertension*. Humana Press, Totowa, NJ, 2008.

OTHERS (Case Reports, Letters, etc.)

1. Weiland D, **Hill, NS**. Acquired immunodeficiency syndrome. *Ann Intern Med* 1983, 99:735.
2. **Hill NS**, Mark EJ. Case records of the Massachusetts General Hospital: A 61-year-old man with worsening dyspnea and evidence of pulmonary hypertension. *N Engl J Med* 1985, 313:1003-1012.
3. **Hill NS**, Mark EJ. Case records of the Massachusetts General Hospital: A 33-year-old man with cough, fever, and a left pleural effusion. *N Engl J Med* 1988, 318:1257-1267.
4. **Hill NS**, Meyer TJ, Kramer NR, Meharg J. Randomized prospective trial of noninvasive positive pressure ventilation in acute respiratory failure: (letter) *Am J Respir Crit Care Med* 1996, 153:1188-1189.
5. **Hill NS**. Preface in Non-invasive ventilatory support: a practical handbook. In: AK Simonds, ed. Arnold, London 2nd ed. 2001.
6. Preston IR, Klinger JR, Houtchens J, Nelson D, Mehta S, **Hill NS**. Pulmonary edema caused by inhaled nitric oxide in two patients with pulmonary hypertension associated with the CREST syndrome. *Chest* 2002; 121:656-659 (Case Report).
7. Stone AS, Nolan S, Al Bebeisi M, McCool JD, **Hill NS**. A novel form of manually-assisted ventilation (Case report). *Chest* 2003, 123:949-942.
8. Devlin JW, Garpestad E, **Hill NS**. Neuromuscular blockers and ARDS. *N Engl J Med.* 2010 Dec 23; 363(26):2562; author reply 2563-4. No abstract available.
9. **Hill NS**. Commentary on "Review: Lower rather than higher tidal volume benefits patients without ARDS". *ACP Journal Club* 2013; 158(6):JC4.
10. **Hill NS**. ACP Journal Club. Review: lower rather than higher tidal volume benefits ventilated patients without ARDS. *Ann Intern Med.* 2013 Mar 19; 158(6):JC4.

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

11.Gaga M, Powell CA, Schraufnagel DE, Schönfeld N, Rabe K, **Hill NS**, Sculier JP; ATS/ERS Task Force on the Role of the Pulmonologist in the Management of Lung Cancer. An official American Thoracic Society/European Respiratory Society statement: the role of the pulmonologist in the diagnosis and management of lung cancer. *Am J Respir Crit Care Med.* 2013 Aug 15; 188(4):503-7.

12.Magill SS, Klompas M, Balk R, Burns SM, Deutschman CS, Diekema D, Fridkin S, Greene L, Guh A, Guterman D, Hammer B, Henderson D, Hess DR, **Hill NS**, Horan T, Kollef M, Levy M, Septimus E, VanAntwerpen C, Wright D, Lipsett P. Developing a new, national approach to surveillance for ventilator-associated events: executive summary. *Chest.* 2013 Nov;144(5):1448-52. PMID: 24189858. Also published in *Clin Infect Dis.* 2013 Dec;57(12):1742-6, *Infect Control Hosp Epidemiol.* 2013 Dec; 34(12):1239-43, *Am J Crit Care.* 2013 Nov; 22(6):469-73, *Am J Infect Control.* 2013 Nov; 41(11):1096-9, and *Crit Care Med.* 2013 Nov; 41(11):2467-75.

13.Magill SS, Klompas M, Balk R, Burns SM, Deutschman CS, Diekema D, Fridkin S, Greene L, Guh A, Guterman D, Hammer B, Henderson D, Hess DR, **Hill NS**, Horan T, Kollef M, Levy M, Septimus E, VanAntwerpen C, Wright D, Lipsett P. Executive summary: Developing a new, national approach to surveillance for ventilator-associated events. *Ann Am Thorac Soc.* 2013 Dec; 10(6):S220-3.

14.Dweik RA, Rounds S, Erzurum SC, Archer S, Fagan K, Hassoun PM, **Hill NS**, Humbert M, Kawut SM, Krowka M, Michelakis E, Morrell NW, Stenmark K, Tudor RM, Newman J; ATS Committee on Pulmonary Hypertension Phenotypes. An official american thoracic society statement: pulmonary hypertension phenotypes. *Am J Respir Crit Care Med.* 2014 Feb 1; 189(3):345-55.

15.Al-Naamani N, Roberts KE, **Hill NS**, Preston IR. Imatinib as rescue therapy in a patient with pulmonary hypertension associated with Gaucher disease. *Chest.* 2014 Sep; 146(3):e81-3.

16.Angus DC, Deutschman CS, Hall JB, Wilson KC, Munro CL, **Hill NS**. Choosing wisely® in critical care: maximizing value in the intensive care unit. *Crit Care Med.* 2014 Nov; 42(11):2437-8.

17.Spoletini G, **Hill NS**. Response. *Chest.* 2015 Oct;148(4):e127-8. doi: 10.1378/chest.15-1463. PMID: 26437823

18.Al-Naamani N, Preston IR, Paulus JK, **Hill NS**, Roberts KE. Reply: The Diastolic Pressure Gradient Does Not-and Should Not-Predict Outcomes. *JACC Heart Fail.* 2015 Oct;3(10):846. doi: 10.1016/j.jchf.2015.07.007. PMID: 26450005.

19.Preston IR, Roberts KE, Miller DP, Sen GP, Selej M, Benton WW, **Hill NS**, Farber HW. Response to Letter Regarding Article, "Effect of Warfarin Treatment on Survival of Patients With Pulmonary Arterial Hypertension (PAH) in the Registry to Evaluate Early and Long-Term PAH Disease Management (REVEAL)". *Circulation.* 2016 May 17;133(20):e662. doi: 10.1161/CIRCULATIONAHA.116.022321. PMID: 27185031 .

20.Newman JH, Rich S, Abman SH, Alexander JH, Barnard J, Beck GJ, Benza RL, Bull TM, Chan SY, Chun HJ, Doogan D, Dupuis J, Erzurum SC, Frantz RP, Geraci M, Gillies H, Gladwin M, Gray MP, Hemnes AR, Herbst RS, Hernandez AF, **Hill NS**, Horn EM, Hunter K, Jing ZC, Johns R, Kaul S, Kawut SM, Lahm T, Leopold JA, Lewis GD, Mathai SC, McLaughlin VV, Michelakis ED, Nathan SD, Nichols W, Page G, Rabinovitch M, Rich J, Rischard F, Rounds S, Shah SJ, Tapson VF, Lowy N, Stockbridge N, Weinmann G, Xiao L. Enhancing Insights into Pulmonary Vascular Disease through a Precision Medicine Approach. A Joint NHLBI-Cardiovascular Medical Research and Education Fund Workshop Report. *Am J Respir Crit Care Med.* 2017 Jun 15;195(12):1661-1670. doi: 10.1164/rccm.201701-0150WS. PMID: 28430547

21.Rochwerg B, Brochard L, Elliott MW, Hess D, **Hill NS**, Nava S, Navalevi P Members Of The Steering Committee, Antonelli M, Brozek J, Conti G, Ferrer M, Guntupalli K, Jaber S, Keenan S, Mancebo J, Mehta S, Raoof S Members Of The Task Force. Official ERS/ATS clinical practice guidelines: noninvasive ventilation for acute respiratory failure. *Eur Respir J.* 2017 Aug 31;50(2). pii: 1602426. doi: 10.1183/13993003.02426-2016. Print 2017 Aug. PMID: 28860265

22.Jaber S, Bellani G, Blanch L, Demoule A, Esteban A, Gattinoni L, Guérin C, **Hill N**, Laffey JG, Maggiore SM, Mancebo J, Mayo PH, Mosier JM, Navalevi P, Quintel M, Vincent JL, Marini JJ. The intensive care medicine research agenda for airways, invasive and noninvasive mechanical ventilation. *Intensive Care Med.* 2017 Sep;43(9):1352-1365. doi: 10.1007/s00134-017-4896-8. Epub 2017 Aug 7. Review. PMID: 28785882.

23.**Hill NS**. High Flow Nasal Cannula, Is There a Role in COPD? *Tanaffos.* 2017;16(Suppl 1):S12. PMID: 29158751.

24.**Hill NS**. Does Noninvasive Ventilation Have a Role in Severe COPD? *Tanaffos.* 2017;16(Suppl 1):S13. PMID: 29158752.

25.Pisani L, **Hill NS**, Pacilli AMG, Polastri M, Nava S. Response. *Chest.* 2018 Oct;154(4):992. doi: 10.1016/j.chest.2018.07.009. PMID: 30290941

26.Penumatsa KC, Warburton RR, **Hill NS**, Fanburg BL. Rebuttal from Krishna C. Penumatsa, Rod R. Warburton, Nicholas S. Hill and Barry L. Fanburg. *J Physiol.* 2019 Feb;597(4):983. doi: 10.1113/JP276981. Epub 2018 Nov 29. PMID: 30499182

27.**Hill NS**, Spoletini G. Response to letter: Comparing high flow nasal therapy and standard oxygen during breaks off non-invasive ventilation. *J Crit Care.* 2019 Jun;51:220. doi: 10.1016/j.jcrc.2019.01.015. Epub 2019 Jan 31. PMID: 30797612

28.Gayen SK, Abdelrahman AA, Preston IR, Petit RD, **Hill NS**. Vitamin C Deficiency-Induced Pulmonary Arterial Hypertension. *Chest.* 2020 Feb;157(2):e21-e23. doi: 10.1016/j.chest.2019.06.043. PMID: 32033656

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

29. Stuewe E, **Hill NS**, Kher S. Eliciting History of Prior Severe Acute Respiratory Syndrome Coronavirus 2 Infection in Diagnosing Interstitial Lung Disease during the Coronavirus Disease 2019 Pandemic. *Chest*. 2021 Mar;159(3):1306. doi: 10.1016/j.chest.2020.10.028. PMID: 33678262

30. Raoof S, Nava S, Carpati C, **Hill NS**. Response. *Chest*. 2021 Jun;159(6):2505-2506. doi: 10.1016/j.chest.2021.02.031. PMID: 34099133.

31. Lowery MM, **Hill NS**, Wang L, Mehra R. Reply: Probing Sleep-Related Hypoxia's Impact on RV Dysfunction and PAH Survival: Uncertainties Clarified? *J Am Coll Cardiol*. 2024 Mar 19;83(11):e109. doi: 10.1016/j.jacc.2024.01.014. PMID: 38479961 .

32. Duggal A, Conrad SA, Brochard L, Brodie D, **Hill NS**. Reply to Tiruvoipati *et al.*: VENT-AVOID Trial: Avoiding Acute Hypercapnic Respiratory Failure! *Am J Respir Crit Care Med*. 2024 Jun 15;209(12):1515. doi: 10.1164/rccm.202403-0618LE. PMID: 38608271

33. Strick DJ, Farber HW, **Hill NS**, Preston IR, Pradhan NM, Malla B. Group 5 Pulmonary Hypertension Associated With T-Cell Large Granular Lymphocytic Leukemia: Hemodynamics and Treatment. *Chest*. 2024 Jul;166(1):e1-e3. doi: 10.1016/j.chest.2024.01.046. PMID: 38986644

34. LaBarbera VA, Gill E, **Hill NS**, Sachs G. The Louise Wilcox ALS Clinic at Rhode Island Hospital: 25th Anniversary (1999-2024). *R I Med J* (2013). 2024 Jul 1;107(7):51-53. PMID: 38917317

INVITED LECTURES (Since 2018)

2018

➤ The 3rd Joint International Meeting: 15th International Conference on Home Mechanical Ventilation (JIVD) & 6th European Respiratory Care Association Congress: Scientific Sessions: High O₂ flow Part 1: From physiology to evidence. HOF: Only a Question of Oxygen?" Lyon, France. March 2018

➤ National Association for Medical Direction of Respiratory Care (NAMDRC) 2018: Update in Pulmonary, Critical Care and Sleep Medicine. The 41st Annual Meeting and Educational Conference Jointly provided by CHEST® American College of Chest Physicians: Walter O'Donohue Lecture: "Humidified High Flow Nasal Cannulae Oxygen Therapy." Carlsbad, California. March 2018

➤ New Jersey Thoracic Society (NJTS) Annual Scientific Program: Plenary Session: Past, Present and Future of Non-Invasive Ventilation. New Brunswick, NJ. April 2018.

➤ MGH Conference On Obesity: Invited Speaker: "Obesity in Pulmonary Hypertension." Boston, MA. March, 2018.

➤ The Annual International Conference 2018: American Thoracic Society (ATS). Chair: Session: Division of Lung Diseases NHLBI/NIH: Initial Findings from The NHLBI PVDOMICS Program: Deep Phenotyping of Patients with Pulmonary Hypertension. Chair: Session: RAPID: RAPID Abstract Poster Discussion: Critical Care: Invasive, Non-Invasive, Conventional, and Non-Conventional Ventilation In Acute Respiratory Failure. San Diego, California. May 2018

➤ The MGH Pulmonary Research Series: Invited Speaker: "Update on Non-Invasive Ventilation Research." Boston, MA. June 2019.

➤ American Association for Respiratory Care, AARC. 57th RESPIRATORY CARE Journal Conference on Noninvasive Respiratory Support in Adults. Invited Speaker: "Non-Invasive Ventilation for Hypercapnic Respiratory Failure." Petersburg, Florida. June 2018

➤ XIX Foro Internacional de Medicina Crítica / International Forum of Critical Medicine (Mechanical Ventilation - Sepsis and Selected Topics): Presenter: "High Flow Nasal Ventilation in ARDS-Right or Mistaken?", "Update on the Management of Right Cardiac Failure." Mexico City, México. July 2018

➤ IMPACT PH Mentor and Meeting - Total CME: Invited Speaker: "ICU Management of Pulmonary Hypertension." Pismo Beach, California. September 2019

➤ The 22nd Annual Thomas J. Godar Pulmonary/Critical Care Symposium, Saint Frances Hospital and Medical Center: Invited Speaker: "Chronic Pulmonary Arterial Hypertension 2018- "Did we climb the top of the mountain ye or long way to go?" Hartford, CT. September 2018

➤ Chest 2016, the Annual Meeting of the American College of Chest Physicians. Leadership Training Course Speaker: "Nasal High Flow." San Antonio, CA. October 2018

➤ Annual Fall Respiratory Therapy Symposium. New York Downstate Association for Respiratory Therapists Inc. (NYDART). Speaker: "Nasal High Flow Therapy; How does it help and where do I use it?" Long Island, NY. October 2018.

➤ The 11th Annual New England Heart Failure and Transplant Network Conference, Tufts University School of Medicine: Speaker: "Update on the Evaluation and Management of Pulmonary HTN in Left Heart Failure," Waltham, MA, November 2018.

➤ St. Luke's Hospital: ILD Talk: "Diagnosis and Management of Idiopathic Pulmonary Fibrosis" New Bedford, MA. November 2018

NICHOLAS S. HILL, M.D.

CURRICULUM VITAE 2025

- Rheumatology Grand Rounds, Tufts Medical Center. Invited Speaker: "Pulmonary Hypertension in Connective Tissue Disease." Boston, MA. November 2018.
- 2nd Annual Excellence Experience In Pulmonary Hypertension at Tufts Medical Center. Spanish Physicians Workshop - Right Heart Catheterization in PH. Boston, MA. December 2018
- Course Director. The 16th Annual Tufts Pulmonary Hypertension Symposium: Moderator: Morning Plenary Session, The Great Debate: How Early to Treat PAH and Challenging Cases: Exercise-Induced PAH." Boston, MA. December 2018
- Morton Hospital: IPF Talk: "Diagnosis and Management of Idiopathic Pulmonary Fibrosis." Taunton, MA. December 2018
- Sutter Health Care: Noon Talk: Respiratory Management of Late Onset Pompe Disease (LOPD), San Francisco, CA. December 2018

2019

- Grand Rounds, Lowell General Hospital: "Impacting Hospital Readmission for Advanced COPD". Lowell, MA. January 2019
- Invited Speaker/PH Clinic,: "CTD-PAH", UMASS Memorial Medical Center, Worcester, MA.. January 2019.
- Invites Speaker, California Pacific Medical Center: "Respiratory Management of Late Onset Pompe Disease (LOPD)". San Francisco, CA. January 2019
- Pulmonary Grand Rounds, University/Bellevue Bellevue Hospital: "Noninvasive Ventilatory Techniques", New York, NY. March 2019
- Visiting Professor-Pulmonary Grand Rounds, University of Vermont Medical Center,: "Challenges in Pulmonary Hypertension". Burlington, VT. March 2019.
- NAMDRC Annual Meeting 2019: Advances in Pulmonary, Critical Care and Sleep Medicine and Educational Conference. "Nasal High Flow for Acute Respiratory Failure". Sonoma, CA. March 2019
- New York State Thoracic Society (NYSTS) 2019 Meeting. "Noninvasive Ventilation in Neuromuscular Disease". Weill Cornell Medical College, NYC, NY. March 2019
- Simply Speaking PAH® CME/CE: "Research Updates and Potential New Directions in PAH Management". Boston, MA. April 2019
- Boehringer Ingelheim 2019 Discovery Award in IPF/ILD - Chair, Scientific Review Committee Meeting. Boston, MA. April 2019
- The Annual International Conference 2019: American Thoracic Society (ATS). .Presenter Scientific Symposium -: Crossing The Border: Mildly Increased Pulmonary Artery Pressure And The New Definition Of Pulmonary Hypertension: "Normal Limits of Pulmonary Artery Pressure and the Evolving Definition of Pulmonary Hypertension". Chair, Clinical Session: Clinical Findings From The NHLBI PVDOMICS Program In Patients With Pulmonary Hypertension. Dallas, TX. May 2019.
- Clinical talk: "The Evolving Science of Asthma". Falmouth, ME, June 12, 2019
- Maine General Allergy & Asthma "The Evolving Science of Asthma", Augusta, ME, June 12, 2019
- Clinical Talk: "Respirator Management of Late Onset Pompe Disease", Indianapolis. June 25th 2019
- New York State Society for Respiratory. Plenary Speaker: "Noninvasive Ventilatory Techniques; Changing Paradigm" Verona, NY, September 2019
- University of Michigan Pulmonary Conference. Invited Speaker. Keynote Address: "Home Noninvasive Techniques to Assist Ventilation in Critical Care; An Evolving Paradigm". "Noninvasive Ventilation for COPD". Ann Arbor, Michigan. September, 2019
- 2019 CHEST Annual Meeting: "Clinical Applications of Nasal High Flow". New Orleans, LA. October 2019
- Kjelgaard Memorial Maine Medical Center Pulmonary Symposium – "NIPPV for Acute Respiratory Failure". November 2019
- Tufts Medical Center: "Hypercapnic Respiratory Failure for Residents". Boston, MA, November 2019
- Tufts 17th Annual Update in Pulmonary Hypertension. Course Director. Great Debate: "NICE Hemodynamics: Should 21 Be the New 25? " December 2019
- Clinical Talk. Eastern Maine Pulmonary Associates: "Evolving Science of Asthma", Bangor, ME December 2019

2020

- Northern California Thoracic Society: Keynote Speaker "High Flow Oxygen for ARDS' and "Update in Diagnosis and Classification of PAH" Monterey, CA. January 2020
- Medical Grand Rounds, Baystate Medical Center "The Evolving Paradigm of Noninvasive Management of Acute Respiratory Failure" Springfield, MA January, 2020
- Panelist. The Climate Crisis and Clinical Practice Symposium. Joseph B. Martin Conference Center, Boston, MA., February 12, 2020
- Pulmonary Grand Rounds: Challenges in the Management of Pulmonary Hypertension. Visiting Professor. National Jewish Hospital, Denver, CO. March 2020
- Respiratory Complications of Pompe Disease /UCSF Neurology (Virtual). March 2020
- Noninvasive Respiratory Support for COVID Pneumonia Association of American Indian Physicians (Virtual). March 2020

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CURRICULUM VITAE 2025

- Medical Grand Rounds: Noninvasive Respiratory Support for COVID (Virtual). Tufts Medical Center, Boston, MA. April 2020
- NIV for COVID. Virtual: Indian American Medical Society. June 2020
- Webinar: “Respiratory Impact of COVID”. Phillips Medical. July 2020
- Webinar International Society of Heart and Lung Transplantation (ISHLT) Annual Meeting. Presentation of “Results of INPIRE study of dry powder inhaled treprostinil in PAH” Oral Session July 2020
- Pulmonary Lecture Series: “Diagnostic Challenges of Pulmonary HTN”. (Virtual). Tufts Medical Center, Boston, MA August 2020
- Pulmonary Grand Rounds; Regents Hospital. “Respiratory Management of COVID-induced Respiratory Failure.” (Virtual) University of Minnesota. October 2020
- CHEST 2020: Symposium on Noninvasive Ventilation for COPD. “Presentation on Noninvasive Ventilation for Ambulatory COPD”. (Virtual). October 2020
- Webinar: “Noninvasive Respiratory Support for COVID 19” Aerogen, Inc. November 2020
- 2020 COVID-19 Research Symposium. (Virtual) Tufts Medical Center, Boston, MA. November 2020
- Invite Speaker: Houston Methodist Medical Center: “Noninvasive Ventilation in COVID Time” (Virtual). December 2020

2021

- Physical Medicine and Rehabilitation Lecture: “Noninvasive Ventilatory Management of Neuromuscular Disease”. (Virtual) Tufts Medical Center, Boston, MA. January 2021
- Pulmonary Vascular Disease Roundtable: “Findings from the Pulmonary Vascular Disease Omics Network. (Virtual) Sponsor United Therapeutics. March 2021
- Clinical Pharmacology Course for 4th year Medical Students, Tufts University School of Medicine. “Pulmonary Pharmacology”. Webinar. March 2021
- Invited Speaker: New York Downstate Association of Respiratory Therapists: “High Flow Nasal Cannula for COVID” Virtual Event: April 2021
- Webinar: Tufts University School of Medicine: 1st year Pathophysiology Course Small Groups: Group Leader for Pulmonary Pathophysiology”. April 2021
- Webinar Presentation: “Pulmonary Hypertension with Interstitial Lung Disease”. Practice Point CME. June 2021
- Webinar Presentation: Panelist: “Conversations on Pulmonary Arterial Hypertension”. Practice Point CME. June 2021

2022

- Irish Thoracic Society: Presenter, “Noninvasive Respiratory Support in the Pandemic”. Virtual Event. October 2021
- CHEST Annual Meeting. Speaker: “Exploring the Potential for Risk Reduction and Right Heart Reverse Remodeling in PAH: A Focus on Upfront Combination Therapy”. “Ambulatory Ventilatory Assist devices for COPD.” Virtual Event: Chicago IL. November 2021
- Presenter: “NRS for COVID, what have we learned?” CME Saxe Healthcare Communications. Virtual Event. November 2021
- Course Director. The 18th Annual Tufts Pulmonary Hypertension Symposium: Moderator: Panel Discussion /Audience Q&A: Clinical Research Progress and Pipeline. Presenter: “Waiting to inhale: Emerging Inhaled Therapies. Discussant: Group 3 Pulmonary Hypertension- New Screening Algorithm for PH_ILD. PAH Improv: Hot Topics in PAH. Boston, MA. December 2021
- Presenter: “Evaluation and treatment of PH-ILD.” CME Practice Point Communications. Virtual Event. December 2021
- Pulmonary/Critical Care Grand Rounds. Presenter: “Noninvasive respiratory support for Covid-19 - What Have We learned?” Northwell Lung Institute. Virtual Event: January 2022
- Pulmonary Grand Rounds. Speaker, “New Concepts and Controversies in PAH” IMPAHCT PH University of Connecticut Sponsored by Pulmonary Hypertension Association. January 2021
- Presenter: “Talking PAH – Panel discussion”. CME Practice Point Communications. Live Webcast. March 2022
- Presenter: “Exploring Next Generation Enzyme Replacement Therapies for Pompe Disease”. Sponsored by Catalyst Medical Education. Virtual Event. April 2022
- The Annual International Conference 2022: American Thoracic Society (ATS).
- Lead Facilitator, Scientific Symposium: “PAH Therapeutics”, San Francisco, CA. May 2022
- Presenter: “New Concepts and Controversies in PAH” IMPAHCT PH slide deck”. Sponsored by Pulmonary Hypertension Association. Webinar: June 2022
- Presenter: “Advanced Clinical Cases Studies to Improving the Burden of COPD”, CME Practice Point Communications. Webinar: June 2022
- Pulmonary Clinical Lecture Series, Speaker: “Introduction to classification and diagnosis of PH.” Tufts Medical Center. Boston, MA. August 2022
- Presenter: “Case-Based Strategies to Integrate Recent Progress in PH-ILD”. CME Practice Point Communications. Webinar: August 2022

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CURRICULUM VITAE 2025

- Presenter: "Talking COPD: Advanced Clinical Case Studies to Improve the Burden of COPD". CME Practice Point Communications. Webinar September 2022
- Annual Chest Meeting Symposium, Speaker: Bronchoscopic Lung Volume Reduction surgery for the busy clinician. Selecting the right patient. Nashville, TN. October 2022
- Vanderbilt Symposium to Honor John Newman and James Loyd. Speaker on Dr. Newman's contributions to the PVDOMICS initiative. Nashville, TN. October 2022
- Research Triangle Pulmonary Hypertension Symposium. Speaker: "PAH Drug Discovery: State of the Art in 2022". Durham, NC. November 2022
- Rhode Island Thoracic Society Meeting, Speaker: "Evaluation and Management of Respiratory Complications of Neuromuscular Disease." Kent County Hospital, Warwick, RI. November 2022
- Presenter: "Exploring the Benefits of At-Home Noninvasive Ventilation (NIVH) in Adults with COPD" Sponsored by Movair, Inc. Webinar: November 2022
- 2022 Gold International COPD Conference, Speaker: "Incidence of Pulmonary Hypertension in COPD" Sponsored by Temple University. Philadelphia, PA. November 2022

2023

- Course Director: The 19th Annual Tufts Pulmonary Hypertension Symposium: Plenary Session Moderated: Use of Balloon Catheters to Improve Pulmonary Arterial Compliance In PAH. Risk Scoring as a Primary Endpoint: Is it Ready for Primetime? Boston, MA. December 2022
- Medtrade "Qualifying Patients for Home Mechanical Ventilation". Dallas, TX. March 28, 2023
- The National Heart, Lung, and Blood Institute (NHLBI) : Speaker: Sleep Health and Dysfunction Across the Spectrum of Pulmonary Vascular Disease: Sleep disordered breathing in Group 3 PH & Abstract & Knowledge Gap Questions . Virtual Workshop. August 30, 2023
- Ground Rounds, UMASS Memorial Medical Center. Invited Speaker/PH Clinic, PH Therapeutics. Worcester.MA. September 8, 2023
- Pulmonary Clinical Lecture Series, Tufts Medical Center. Speaker: "Introduction to PH" Boston, MA. November 2023
- Course Director: The 20th Annual Tufts Pulmonary Hypertension Symposium: Moderator, The Continuum of PH-ILD: WHO, When and How to Treat. Boston, MA. December 2023

2024

- PVRI 2024 Annual Congress- The Next 50 Years Of Pulmonary Hypertension - A global view. Speaker, New Modalities & Technologies for PH and RHF: Innovation in inhalation therapy for PH: Insights on drugs under development for PH and their delivery characteristics. Riverbank, London. January 2024
- The Annual International Conference 2024: American Thoracic Society (ATS). Chair Scientific Symposium: New Omics Findings from the NHLBI Pvdomics Program In Pulmonary Hypertension Patients. Authors, Abstract Session Poster: Pulmonary Rehabilitation: Covid-19, Critical Illness, And Quality Improvement: Regional Lung Ventilation and Perfusion in Individuals with Post-acute Sequelae of SARS-CoV-2 Infection (PASC). Author Scientific Abstract Poster: OP GUN: NOVEL THERAPEUTICS AND OUTCOMES IN PAH: Baseline Characteristics from the IMPAHCT Trial of AV-101, Inhaled Imatinib, in Subjects with Pulmonary Arterial Hypertension. Balboa Park Explorers: Translational Science And Epidemiology In PH Pulsatile Loading Affects Right Ventricular Function in Pulmonary Hypertension Due to Chronic Lung Disease. |San Diego, CA. May 2024
- CHEST 2024 **Presenter:** Imaging Of Chronic Thromboembolic Pulmonary Hypertension: A Chest Fleischner Society Session: Interesting Case Presentation. Management Strategies In Chronic Respiratory Failure: A Pro-Con Debate: Management Of Chronic Hypercapnic Respiratory Failure Should Not Target Normal Pco₂. Case-Based Presentation Of New CMS NIV Reimbursement Criteria: Singin' The Rad Type Rules: The Patient with COPD. Hot Topics In Neuromuscular Respiratory Failure: Pregnancy, When/If Tracheostomy, And Asthma/COPD: Challenges in Longevity: Navigating NIV with Neuromuscular Weakness and Obstructive Lung Disease. **Panelist:** A New Era: Addressing Monumental Withdrawal Of Sleep And Respiratory Care Products In USA. Boston, MA. October 2024
- Course Director: The 21st h Annual Tufts Pulmonary Hypertension Symposium: Plenary Session -Moderator: Use of Balloon Catheters to Improve Pulmonary Arterial Compliance In PAH. Risk Scoring as a Primary Endpoint: Is it Ready for Primetime? PAH Improv: Hot Topics in PAH. Boston, MA. December 2024

2025

- PVRI 2025 Rio Annual Congress- Embracing Heterogeneity. Introduction Speaker, New Modalities & Technologies in RHF & PH. Rio de Janeiro, Brazil. January 2025.
- Course Faculty .NYU Grossman School of Medicine: Advances in Home Mechanical Ventilation: From the Iron to Artificial Lung, High-Flow Nasal Cannula (HHFNC) and Non-Invasive Ventilation (NIV) in COPD.. NY, NY. March 14, 2025.
- Grand Rounds, Wyckoff Heights Medical Center. New Insights in the Management of PH Associated with ILD: A Primer on Recognition, Severity Evaluation, and Treatment. April 22, 2025. Brooklyn, NY.

Stephan Ogenstad, Ph.D.

STEPHAN OGENSTAD, Ph.D. Expert Biostatistician Consultant

Wake Forest, NC 27587, USA, [REDACTED]

e-mail: [REDACTED] sogenstad@Statogen.com, website:
www.statogen.com

QUALIFICATION SUMMARY

- Ph.D. in Statistics, with 25 years of applicable industry experience
- Serves as a biostatistics and biometrics expert witness in high-stakes pharmaceutical and medical device litigations. Sixteen litigations to date.
- Expertise in Toxicology, Pre- & Nonclinical, Phases I - IV in Biostatistics, Data Management, Statistical Programming, and eTechnology across various therapeutic areas
- Analyzed 650+ (460+ as the lead statistician) clinical studies, 40+ ISS and ISE
- Extensive experience in successfully building effective, innovative, and dynamic biometrics departments
- Extensive proficiency in Data and Safety Monitoring Committee functions, the regulatory processes internationally, commercial product development, and business development.
- Dr. Stephan Ogenstad is the founder, President of Statogen Consulting LLC, and co-founder of Innovalyst, LLC. Prior to founding Statogen Consulting in 2006, he held the position as Vice President of Biometrics at Vertex Pharmaceuticals Incorporated in Cambridge, Massachusetts, and prior to Vertex held senior executive positions at Parexel International, Amgen, and AstraZeneca.
- Have contributed to the filing of 40+ NDA/BLA/IDE submissions in Europe, the USA, and Japan
- Chairing several reputable societies and has more than 100 publications, book chapters, and presentations in the areas of biostatistics and medicine.

AREAS OF OPERATION

Project collaborations with biotech, pharmaceutical, and medical device companies in the US and Europe, Law firms, Marketing companies, Massachusetts Institute of Technology, Georgia Southern University, and the Royal Institute of Technology, Stockholm, Sweden, where there are high-level strategy and problem-solving challenges, where his expertise can become fully utilized.

Most of the project collaborations are as an expert witness in large pharmaceutical litigations, on innovative technology, surveys, actuarial risk analysis, submission strategy and statistical specialty methods, dose-finding, MCP-Mod, high-intensity modeling and simulation, risk analysis and decision-making strategies and as independent statistician, he serves on Data and Safety Monitoring Boards. He interacts with FDA and EMA personnel at committee meetings and scientific advisory committee meetings on behalf of his clients.

CLIENTS

Disclosed: Novo Nordisk, BeyondSpring, Bellicum Pharmaceuticals, CSL Behring, CTI Pharmaceuticals, Enveda Biosciences, Ferring Pharmaceuticals, Vertex Pharmaceuticals,

Massachusetts Institute of Technology, Royal Institute of Technology, Cephalon, Dechert LLP, Clinton Health Access Initiative, Incyte Corporation, Harvard Apparatus, T2 BioSystems, Stomedix, Pulmetrix, Niconovum, Pharma Group Consulting, Rubin/Anders, The Weinburg Group, Trial Care International, InnaVirVax, Presidio, Pharmalys, Concert Pharmaceuticals, CardioMEMS, Biothera, BioBridges, BioMimetic Therapeutics, Sensible Medical Innovations, Care-Safe, Brooks Rehabilitation, LFB Biotechnologies, CellAct, F Star, Georgia Southern University.

EXPERIENCE WITH STATISTICAL METHODS

Apart from standard statistical methods, special expertise in epidemiology, meta-analysis, actuarial risk analysis, survey methodology, adaptive methods, dose-finding, Proof-of-Concept, survival and recurrent event methods, experimental design, assays, mathematical modeling and simulation in trial design and biometrics and pharmacometrics, data-mining, machine learning, artificial intelligence, and super-computer applications.

EXPERIENCE IN THERAPEUTIC AREAS

Twenty-five years of experience in pre-clinical through Phase IV clinical trials. Therapeutic specialization in ALS, Vaccines, Local Anesthetics and Analgesics, Diabetes, Diabetic Peripheral Neuropathic Pain, Central Nervous System (anti-psychotics, anti-depressives, stroke and Alzheimer's disease), HIV/AIDS, Oncology (AML, Breast Cancer, Cervical Cancer, Colorectal Cancer, CLL, NHL, Leukemia, Hodgkin's Disease, Pancreatic, Prostate, Sarcoma, SCLC, NSCLC), Infectious Diseases (Anti-Bacterial and CMV, HSV, HCV), Cardiology, Urology, Lupus (SLE, LN), Rheumatoid Arthritis, Neurology, Dentistry, Psoriasis, and Transplants.

EDUCATION

- Ph.D., Statistics, Stockholm University, Stockholm, Sweden, 1982. Thesis title: Statistical Analysis of Censored Survival Time Data in Clinical Trials.
- B.Sc., Mathematics, Statistics, Computing, Stockholm University, 1974
- L'Examen de Français Commercial de la Chambre de Commerce Française en Suède, Stockholm, 1974
- Business economics, Stockholm University, 1974

LANGUAGES

Swedish, English, French, German.

EMPLOYMENT HISTORY

Center for Professional Advancement **2009-present**

Course Director of Biostatistics

Georgia Southern University **2009-present**

Adjunct Faculty Member and Professor of Biostatistics

Innovalyst LLC, Research Triangle Park, NC **2008-present**

Founder and Affiliate

Innovalyst is an Intellectual Capital Advisory Network™ (ICAN), which helps companies shape their business strategy, catalyze the development of innovations, and accelerate commercial success. We catalyze the delivery of high quality, comprehensive, and coordinated support for Life Science organizations.

Innovalyst's focus is on Advanced Technologies for the Life Sciences, Biomarkers and Diagnostics, Pharmaceutical Research and Development, Clinical Study Design and Development, Medical Devices, Informatics and Information Management. Innovalyst excels at Executing Due Diligence, Maximizing the Value of Intellectual Property, Developing and Commercializing Technologies, Accelerating, Research and Development, Leading and Managing Innovative Teams, Projects, and Companies. Innovalyst delivers the following services: Scientific, Medical, and Strategic Insight, Market Research, Product Development, Intellectual Property Asset Management, Business Development and Licensing, Strategic Partnerships, Fund Raising.

Statogen Consulting LLC, Wake Forest, NC

7/ 2006-present

President

Statogen Consulting offers biometrics and pharmacometrics services to assist the biopharmaceutical and medical device industries in bringing new products to market. We assist throughout the entire product cycle, from pre- and non-clinical to first-in-man, dose-response & dose-finding, data and safety monitoring functions, and confirmatory clinical evaluation through submission. We assist in pharmaceutical litigations as statistical expert witness. We also assist in actuarial risk analysis and survey methodology.

Vertex Pharmaceuticals Inc., Cambridge, MA

8/ 1997-7/2006

Vice President, Biometrics, Medicines Development Group.

2005-2006

Senior Director, Biometrics, Drug Evaluation and Approval

2000-2005

Director, Biometrics, Clinical Development

1997 - 2000

Built a global strong, efficient and professional group, of currently 20 people. Implemented and validated entirely workflow, database, electronic data capture, CDISC, adaptive designs, SAS, and built a supercomputer simulation system in collaboration with Texas Tech University and SAS Institute. Responsibilities include management of Clinical Data Managers, Biostatisticians and Statistical Programmers in the entire pre-clinical, non-clinical, and clinical areas. Maintain strong interaction with senior management on program management and improvement initiatives. Chair of the Clinical Scientific Committee, "Rational Drug Development", for the enhancement of cross-functional scientific discussions, and for the betterment of study designs and product development. Chaired the Knowledge Committee, "Knowledge Management", for the improvement of cross-functional knowledge exchange. Project leader for implementation, validation, and training of MedDRA and dsNavigator. Chaired and coordinated eight cross-departmental improvement project teams over the entire Development Division. Chair of the EDC/CDISC Steering Committee, for the optimization of business processes through EDC and CDISC. Leading the initiative of implementing adaptive designs of clinical trials to effectivize clinical drug development. Used computer simulations for modeling and analysis of biometric

and pharmacometric studies. These initiatives have helped Vertex attain its strategic and innovative goals.

Amgen, Thousand Oaks, CA

8/ 1995 – 7/ 1997

Head of the group for oncology and preclinical biostatistics

Built a strong, efficient and professional group of 16 people (mostly PhD statisticians), and gained valuable experience from the largest biotechnology company in the world. Responsibilities included management of biostatisticians in the entire preclinical, non-clinical, and biometric and pharmacometric area as well as in the clinical area of oncology for Neupogen. Frequently interacted with the FDA and investigators worldwide regarding two major BLAs.

PAREXEL International Corporation, Waltham, MA

8/ 1993 – 7/ 1995

Vice President, Biostatistics and Data Management Division

1994-1995

Served on a corporate level to restructure the corporation worldwide, after which the company grew 10-fold. Set long-term goals and objectives and developed performance metrics to track the progress of objectives. Supervised up to five directors and a staff of 220 people. Coordinated statistical, programming, and CDM activities, as well as lead cross-functional activities with other divisions within the company. Established and documented department standard operating procedures with continual evaluation of systems improvement. Served as a technical advisor to staff, clients, and other divisions in the company worldwide. Frequently represented clients at meetings with the FDA. Traveled frequently across the US and Europe to meet with new clients and attract new business.

Director, Biostatistics and Data Management Division

1993 – 1994

Coordinated cross-functional activities and improvements within the company. Represented the company in numerous client meetings. Establish and document department standard operating procedures with continual evaluation of systems improvement. Prepared proposals, including time estimates and general assumptions, to clients. Served as a technical advisor to staff, clients, and other divisions in the company worldwide. Frequently represent the clients at meetings with the FDA.

AstraZeneca (former Astra Arcus and Astra Pain Control), Södertälje, Sweden **8/ 1982 –7/ 1993**

Director, Biostatistics

1987-1993

Managed and mentored 12 biostatisticians and programmers on consulting on protocol design, data collection and management, statistical analysis and statistical reporting, reviewing reports and contributing overall to the submission of 11 NDAs, in local anesthesia and analgesics, CNS (schizophrenia and depression), antibiotics and antivirals. Worked as the Biostatistics liaison, transferring projects to Merck Sharp and Dohme, PA, USA. Involved in development and application of standard operating procedures within AstraZeneca worldwide. Frequently met with regulatory bodies and investigators worldwide.

Senior Biostatistician

1982 - 1987

Project biostatistician in pre- and non-clinical, toxicology, pharmacometrics and all phases of clinical drug development; including development of study protocols, analysis plans, CRFs, data review guidelines, programming, statistical analysis and statistical reporting, reviewing reports and contributing overall to the submission of NDAs. Therapeutic fields of dentistry, CNS, local

anesthetics, anti-biotic and anti-viral. Frequently met with regulatory bodies and investigators worldwide.

Stockholm University, Department of Statistics

11/ 1974 – 7/ 1982

Lecturer and Professor of Statistics

Lecturing in graduate and post-graduate courses in Probability Theory, Inference Theory, Regression & Analysis of Variance, Time Series Analysis, Sampling Techniques, Dynamic Programming, Epidemiology, and Econometrics. Conducted research in the field of survival analysis.

OTHER EXPERIENCES

- *In Silico Biosciences, (former Silico Insights), Inc., Woburn, MA*

Senior Scientific Advisor

1/ 1999 – 12/ 2001

Served as an advisor on scientific and business issues during the formation of an informatics company. In Silico Biosciences technology platform, via computational modeling of physiological systems of CNS Diseases, addresses the urgent needs in information processing of researchers and executives in the pharmaceutical, biotechnology and the healthcare industries.

- **Chief Statistical Advisor** to the Nobel Prize Committee for Medicine and Physiology, 1975 - 1982.
- **The Swedish Cancer Register & Department of Statistics, Stockholm University**
Project epidemiologist evaluating the potential causes and distribution of morbidity and cancer risks 1974 - 1982.
- **Lecturer** at Karolinska Institute, Stockholm, in medical statistics 1974 - 1982.
- **Consulting Statistician and Programmer** at Roche, Hoechst, Essex, Pharmacia, The Wellcome Foundation Ltd., Karolinska Institute, Karolinska Hospital, Radiumhemmet, Huddinge Hospital, Danderyd Hospital, Söder Hospital, Serafimer Hospital, Sahlgrenska Hospital, Swedish Bacteriological Laboratory, and Swedish Board for Technical Development. The Group for Applied Statistics, Stockholm, 1975 - 1982.
- **Lecturer** at the Swedish Academy of Pharmaceutical Sciences in statistical clinical trials methodology, 1982 - 1993.
- **Lecturing** at various research units and marketing companies worldwide within AstraZeneca in "Clinical Trials Methodology from a Statistical Point of View" (a one-week course for Clinical Research Scientists), 1983 - 1993.
- **Presenter** at various conferences worldwide.

TRAINING COURSES

Extensive training in leadership, software systems, therapeutic areas, and statistics (list available).

COMPUTER EXPERIENCE

- Statistical Packages: SAS, S-PLUS, GLIM, BMDP, MATHEMATICA, RS/1, MINITAB, STATXACT, LOGXACT, EAST, PEST, Trial Designer, ACSL, XPRO.
- Database Experience: Oracle
- Programming Languages: Fortran, Cobol, Basic, RPL, JCL, SQL. Python.

PROFESSIONAL AFFILIATIONS

- Chair of the section “Statistical Consulting” of ASA for 2009
- Reviewer of Statistics in Medicine
- President of the North Carolina Chapter of the American Statistical Association, 2007-2011.
- Member of the International Advisory Committee of the University of North Carolina at Greensboro
- 2008 Elected President of the North Carolina Chapter of the American Statistical Association.
- Chair of Massachusetts Biotechnology Council, Biostatistics and Data Management, 1997 to 2005.
- Reviewer to SAS Institute, 1996 to present
- Statistical reviewer of Applied Clinical Trials, 1996 to 1998
- President of the Swedish Society for Medical Statistics, 1991 - 1993
- Council member of Swedish Statistical Association, 1991 - 1993
- Council member and co-founder of European Federation of Statisticians in the Pharmaceutical Industry, 1991 - 1993
- Member of ISCB - Working Party on Statistics in European Drug Regulation, 1991 - 1993
- Member of the Adverse Event Management Group in Coordination of AstraZeneca's Clinical Information Systems, 1992 - 1993
- Member of Guideline for the Internal Statistical Report Group, 1990 - 1993
- Member of AstraZeneca Evaluation Planning Team, 1993
- Member of World-wide Quality of Life and Health Economics Task Force between AstraZeneca and Merck/US, 1991 - 1993
- Chair of Clinical Trials Methodology from a Statistical Point of View, 1983 - 1993

SOCIETY MEMBERSHIPS

American Statistical Association

AWARDS

1999, 2000, 2001 Professional Mentor Recognition Award, School of Public Health and Health Sciences, University of Massachusetts

PUBLICATIONS AND PRESENTATIONS

More than 100 publications and presentations. Most recent:

Pegfilgrastim, but not Plinabulin, Generates a Blood Myeloid Cell (BMC) Repertoire with a Predominant Immunosuppressive Phenotype, Abstract ID: 10493, Submitter: Ramon Mohanlal, MD, PhD, MBA, Co-Author: **Dr. Stephan Ogenstad**

Ogenstad, S. A Statistical Approach to Clinical Trial Simulations. Volume 1: Design of Clinical Trials. Springer ICSA Biostatistics Book Series of the Biopharmaceutical Applied Statistics Symposium (BASS). 2017.

Ogenstad, S. Designing and Analyzing Recurrent Event Data Trials. Volume 1: Design of Clinical Trials. Springer ICSA Biostatistics Book Series of the Biopharmaceutical Applied Statistics Symposium (BASS). 2017.

Ogenstad, S. Generalized Tests in Clinical Trials. Volume 2: Biostatistical Analysis of Clinical Trials. Springer ICSA Biostatistics Book Series of the Biopharmaceutical Applied Statistics Symposium (BASS). 2017.

Brian K. McFarlin, Adam S. Venable, Katie C. Carpenter, Andrea L. Henning, and **Stephan Ogenstad**. Oral Supplementation with Baker's Yeast Beta Glucan Is Associated with Altered Monocytes, T Cells and Cytokines following a Bout of Strenuous Exercise. *Front Physiol*. 2017; 8: 786.

Evaluation of remote dielectric sensing (ReDS) technology-guided therapy for decreasing heart failure re-hospitalizations. 2021. (To be published)

Substantial contributions of key team members: Dan Rappaport PhD, Orit Tennenhaus PhD, Amir Saroka, Elad Gelbart, Viki Yelenski, Naama Rubinstein, Maya Livnat, Meital Tesler, Daniel Gavrieli and **Stephan Ogenstad PhD**.

Pegfilgrastim, but not Plinabulin, Generates a Blood Myeloid Cell (BMC) Repertoire with a Predominant Immunosuppressive Phenotype

Abstract ID: 10493

Submitter: Ramon Mohanlal, MD, PhD, MBA

Co-Author: **Dr. Stephan Ogenstad**

Plinabulin compared to pegfilgrastim for prevention of chemotherapy-induced neutropenia: Randomized Phase II trial to Annals of Oncology. manuscript: ANNONC-2019-2005.

Authors: **Dr. Stephan Ogenstad**, Qingyuan Zhang, Jifeng Feng, Lihua Du, Ramon Mohanlal MD, PhD, Dr. Lan Huang, Yuankai Shi

Manuscript Number: CCR-19-3816

Manuscript Type: Research Briefs: Clinical Trial Brief Report

Manuscript Title: Plinabulin compared to pegfilgrastim for prevention of chemotherapy-induced neutropenia: Randomized Phase II trial

Corresponding Author: Dr. Blayney

Full Author List: Douglas Blayney, Qingyuan Zhang, Jifeng Feng, Yanqiu Zhao, Igor Bondarenko, Ihor Vynnychenko, Nadezhda Kovalenko, Santosh Nair, Emad Ibrahim, Dmitriy Udovista, Ramon Mohanlal, **Stephan Ogenstad**, Lihua Du, Lan Huang, and Yuankai Shi.

Title: Plinabulin phase II trial for chemotherapy-induced neutropenia

Authors and Institutional Affiliation:

Douglas W. Blayney, et al.

Title: Efficacy of Plinabulin vs Pegfilgrastim for Prevention

of Chemotherapy-Induced Neutropenia in Adults

With Non-Small Cell Lung Cancer

A Phase 2 Randomized Clinical Trial

Authors and Institutional Affiliation:

Douglas W. Blayney, MD; Qingyuan Zhang, MD; Jifeng Feng, MD; Yanqiu Zhao, MD; Igor Bondarenko, MD; Ihor Vynnychenko, MD; Nadezhda Kovalenko, MD; Santosh Nair, MD;

Emad Ibrahim, MD; Dmitriy Petrovich Udovista, MD; Ramon Mohanlal, MD, PhD; **Stephan Ogenstad, PhD**; Ene Ette, PhD; Lihua Du, MD; Lan Huang, PhD; Yuan-kai Shi, MD, PhD

Title: A randomized phase 2 trial of plinabulin and pegfilgrastim alone and in combination for the prevention of chemotherapy-induced neutropenia in patients with breast cancer (PROTECTIVE-2) (To be published)

Manuscript ID: ANNONG-2020-3119.

Authors Mohanlal, R., **Ogenstad, S.**

Title: Plinabulin and pegfilgrastim alone and in combination for the prevention of chemotherapy-induced neutropenia in patients with breast cancer (PROTECTIVE-2): A Randomized Trial" (reference number: NPJBCANCER-01381), which was recently submitted to *npj Breast Cancer*. Authors Mohanlal, R., **Ogenstad, S.**

Title: Grade 4 Neutropenia (Gr4N) Frequency as a Population-Based Binary Risk Predictor for Adverse Clinical Consequences of Chemotherapy-Induced Neutropenia (CIN)

Douglas W. Blayney, Ramon Mohanlal, Lan Huang, **Stephan Ogenstad**, Gary H. Lyman

Title: ESMO # 3574 : Severe Neutropenia (Grade 4 Neutropenia) as a Population-Based Predictor for

Adverse Clinical Outcome of Chemotherapy Induced Neutropenia

R. Mohanlal, **S. Ogenstad**, L. Huang, D. Blayney

EXHIBIT 17

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

UNITED THERAPEUTICS
CORPORATION,

Plaintiff,

v.

LIQUIDIA TECHNOLOGIES, INC.,

Defendant.

C.A. No. 23-00975-RGA-SRF

EXHIBIT 17: PLAINTIFF'S BRIEF STATEMENT OF INTENDED PROOFS

I. INTRODUCTION

1. Pursuant to District of Delaware Local Rule 16.3(c)(8), below is a brief statement of what Plaintiff United Therapeutics Corporation (“Plaintiff” or “UTC”) intends to prove at trial in support of its claims. This statement is not exhaustive, and Plaintiff reserves the right to prove any matter identified in the pleadings, in interrogatory or other discovery responses, in its expert reports and declarations, and in accompanying statements of fact and legal issues to be litigated at trial.

2. Plaintiff may also provide additional proof(s) to rebut any alleged proof(s) offered by Defendant before and during trial, in response to rulings by the Court, to the extent any amendments or other events arise that impact the facts or issues for trial, or for other good cause.

II. OWNERSHIP AND STANDING

3. To the extent necessary, Plaintiff will show that it is the lawful owner by assignment of all right, title, and interest in and to United States Patent No. 11,826,327 (the ““327 patent”) (the “Patent-in-Suit”).

4. Plaintiff will show that Defendant Liquidia Technologies, Inc. (“Defendant” or “Liquidia”) is the holder of New Drug Application No. 213005 (“Defendant’s § 505(b)(2) Application”) and an amendment thereto under § 505(b)(2) of the Federal Food, Drug, and Cosmetic Act to the United States Food and Drug Administration (“FDA”) seeking approval to engage in the commercial manufacture, use, or sale, offer for sale, and/or importation into the United States of YUTREPIA® (treprostinil) for inhalation (“Proposed § 505(b)(2) Product”) before expiration of the Patent-in-Suit.

5. To the extent necessary, Plaintiff will show that it has standing to bring and maintain the present action as the owner of the Patent-in-Suit, and that such standing existed at the

time of filing this action.

III. INFRINGEMENT OF THE '327 PATENT

6. Plaintiff will prove by a preponderance of the evidence that submission of Defendant's 505(b)(2) Application literally infringes one or more of 1-11 and 14-19 (the "Asserted Claims") of the '327 patent pursuant to 35 U.S.C. § 271(e)(2).

7. Plaintiff will prove by a preponderance of the evidence that, if FDA grants final approval, Defendant's commercial manufacture, use, or sale, offer for sale, and/or importation into the United States of the Proposed § 505(b)(2) Product, and use of that product by others, will directly infringe one or more of the Asserted Claims and will indirectly infringe by actively inducing and/or contributing to infringement by others, under 35 U.S.C. §§ 271(a), and/or 271(b).

8. Plaintiff will prove by a preponderance of the evidence that Defendant has an affirmative intent to induce, and would induce, physicians, caregivers, and patients to directly infringe the Asserted Claims pursuant to 35 U.S.C. § 271(b), by encouraging physicians, caregivers, and/or patients to administer Defendant's Proposed § 505(b)(2) Product according to Defendant's Proposed Label and Instructions for Use.

9. Plaintiff will prove by a preponderance of the evidence that Defendant will and/or has manufacture(d), import(ed), prepare(d), acquire(d), and/or stockpile(d) Liquidia's Proposed § 505(b)(2) Product in the United States for sale in the United States in anticipation of FDA approval, and/or has administered or caused to be administered to patients in connection with a clinical trial unrelated to seeking FDA approval of the Proposed § 505(b)(2) Product, and that such activities has infringed and/or will infringe the '327 patent.

10. Plaintiff will prove by a preponderance of the evidence that Defendant has willfully infringed one or more Asserted Claims of the '327 patent.

IV. VALIDITY AND ENFORCEABILITY OF THE '327 PATENT

11. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are invalid as anticipated, either expressly or inherently, in view of the prior art. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's anticipation contentions.

12. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are invalid as anticipated based on prior public use. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's public use-based anticipation contentions.

13. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are invalid as anticipated based on prior sale. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's prior sale-based anticipation contentions.

14. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are invalid as obvious in view of the prior art. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's obviousness contentions, including but not limited to objective indicia of non-obviousness.

15. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are invalid in view of the prior art. To the extent Defendant relies on prior art dated prior to the filing date of the Patent-in-Suit but later than April 17, 2020, Plaintiff will meet its burden of producing evidence that at least claims 1-2, 6-11, and 14-16 of the Patent-in-Suit are entitled to claim priority to U.S. Provisional Patent Application No. 63/011,810, filed on April 17, 2020. Once Plaintiff meets this burden of production, the burden then shifts

back to Defendant to prove by clear and convincing evidence that at least claims 1-2, 6-11, and 14-16 of the Patent-in-Suit are not entitled to this April 17, 2020 priority date. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's priority-based invalidity contentions.

16. Plaintiff will meet its burden of producing evidence that the "February 2020 Press Release" reference cited by Defendant meets the requirements of the prior art exception set forth in 35 U.S.C. § 102(b)(1)(A) with respect to at least claims 1-2, 6-11, and 14-16 of the Patent-in-Suit. Once Plaintiff meets this burden of production, the burden then shifts back to Defendant to prove by clear and convincing evidence that the "February 2020 Press Release" is prior art to at least claims 1-2, 6-11, and 14-16 of the Patent-in-Suit.

17. Plaintiff will meet its burden of producing evidence that U.S. Patent No. 10,716,793 ("the '793 patent") meets the requirements of the prior art exception set forth in 35 U.S.C. § 102(b)(2)(C) with respect to at least claims 1-2, 6-11, and 14-16 of the Patent-in-Suit. Once Plaintiff meets this burden of production, the burden then shifts back to Defendant to prove by clear and convincing evidence that the '793 patent is prior art to at least claims 1-2, 6-11, and 14-16 of the Patent-in-Suit.

18. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are invalid as lacking written description. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's written description contentions.

19. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are invalid for improper inventorship. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's inventorship contentions.

20. Defendant bears the burden of proving by clear and convincing evidence that the Asserted Claims of the Patent-in-Suit are unenforceable due to inequitable conduct. Plaintiff will, to the extent necessary, introduce evidence to rebut Defendant's inequitable conduct-based unenforceability contentions.

V. RELIEF

21. Plaintiff will show that it is entitled to judgment that Defendant has infringed, has induced, will infringe, and will induce infringement of each Asserted Claim of the '327 patent.

22. Plaintiff will show that it is entitled to judgment that Defendant has willfully infringed each Asserted Claim of the '327 patent.

23. Because Defendant will fail to show that any Asserted Claim of the '327 patent is invalid, Plaintiff is entitled to a judgment that each Asserted Claim of the '327 patent is not invalid.

24. Because Defendant will fail to show that any Asserted Claim of the '327 patent is unenforceable, Plaintiff is entitled to a judgment that each Asserted Claim of the '327 patent is not enforceable.

25. Plaintiff will show that it is entitled to a judgment pursuant to 35 U.S.C. § 271(e)(4)(A) ordering that the effective date of any FDA approval of Defendant's § 505(b)(2) Application permitting Defendant to commercially manufacture, make, use, offer to sell, sell, market, or import into the United States Defendant's Proposed § 505(b)(2) Product for the indicated treatment of “[p]ulmonary hypertension associated with interstitial lung disease (PH-ILD; WHO Group 3) to improve exercise ability” be not earlier than the expiration date of the '327 patent, inclusive of any extension(s) and additional period(s) of exclusivity to which Plaintiff is or may become entitled.

26. Plaintiff will show that it is entitled to a judgment pursuant to 35 U.S.C. § 271(e)(4)(B) enjoining Defendant, its officers, agents, servants, employees, parents, subsidiaries, affiliate corporations, other business entities, and all other persons acting in concert, participation, or privity with them, their successors, and assigns, from infringing, contributorily infringing, or inducing others to infringe the '327 patent, including engaging in the commercial manufacture, use, sale, offer to sell, and/or importation into the United States of any product that is the subject of Defendant's § 505(b)(2) Application.

27. Plaintiff will show that it is entitled to a judgment declaring that, pursuant to 35 U.S.C. § 285, this is an exceptional case and awarding Plaintiff its attorneys' fees.

28. Plaintiff will show that it is entitled to an award of costs and expenses in this action.

29. Plaintiff will show that it is entitled to such further and other relief as the Court may deem just and proper.

30. To the extent necessary, Plaintiff will rebut any allegation by Defendant that it is entitled to costs and/or attorneys' fees.

31. Plaintiff reserves the right to offer evidence in support of a claim of injunctive relief and will show that it is entitled to injunctive relief should Defendant contest such an injunction.

EXHIBIT 18

EXHIBIT 18

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

)
UNITED THERAPEUTICS CORPORATION,)
Plaintiff,) C.A. No. 23-975 (RGA)
v.)
LIQUIDIA TECHNOLOGIES, INC.,)
Defendant.)

)

DEFENDANT'S BRIEF STATEMENT OF INTENDED PROOFS

Pursuant to D. Del. LR 16.3(c)(9), the schedule set forth in the Scheduling Order (*see* D.I. 45), and the modified schedule set forth in the Stipulation and Order for Pretrial Exchanges (*see* D.I. 292), Defendant Liquidia Technologies, Inc. (“Liquidia”) hereby submits the following brief statement of what Liquidia intends to prove at trial with respect to its defenses and counterclaims, including identifying relief sought.

This statement is not intended to be exhaustive. Liquidia reserves the right to prove any matters identified in the pleadings, discovery, and any of the accompanying statements of facts and legal issues to be litigated at trial. To the extent Liquidia asserts that United Therapeutics Corp. (“UTC”) has failed to meet its burden of proof on any issue, such statement does not constitute an admission that Liquidia has any obligation to prove or disprove any element or any part of any claim or defense on which UTC bears the burden of proof or production. Liquidia does not assume the burden of proof or production as to any matter set forth below unless required to do so by law.

Liquidia reserves its rights to supplement or amend this statement to reasonably respond to any issues that UTC may raise and to rebut any proof(s) offered, or issues raised, by UTC before or during trial. Liquidia further reserves the right to amend and/or supplement this statement, including consistent with the Federal Rules of Civil Procedure and the District of Delaware Local Rules, and to the extent necessary to respond to any ruling by the Court.

I. NONINFRINGEMENT

A. No Direct Infringement

1. Liquidia will establish that there is no and will be no direct infringement of dependent claims 2, 4, 6-10 of U.S. Patent No. 11,826,327 (“the ’327 patent”), which all require measuring and calculating “statistically significant” changes in the treatment effects—increase in

6MWD, reduction in NT-proBNP plasma concentration, reduction in exacerbations of the interstitial lung disease, reduction in clinical worsening events, or increase in FVC. UTC presents no evidence that healthcare providers and/or patients will actively measure treatment outcomes to determine whether statistical significance was achieved. A healthcare provider would also not actively calculate statistical significance in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the Yutrepia™ label does not constitute an affirmative instruction to calculate statistical significance or to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

2. Liquidia will establish that there is no and will be no direct infringement of dependent claims 2, 3, 8, 17-19 of the '327 patent which all require a measurement of 6MWD. For example, there is nothing in the Yutrepia™ label that instructs the measurement of 6MWD and healthcare providers do not measure 6MWD in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the Yutrepia™ label does not constitute an affirmative instruction to measure 6MWD or to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

3. Liquidia will establish that there is no and will be no direct infringement of dependent claims 4-5 of the '327 patent which all require a measurement of plasma concentration of NT-proBNP. For example, there is nothing in the Yutrepia™ label that instructs the measurement of NT-proBNP and healthcare providers do not measure NT-proBNP in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the Yutrepia™ label does not constitute an affirmative instruction to measure NT-proBNP or to refer

to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

4. Liquidia will establish that there is no and will be no direct infringement of dependent claim 6 of the '327 patent which requires a measurement of exacerbations of interstitial lung disease. For example, there is nothing in the YutrepiaTM label that instructs the measurement of exacerbations of interstitial lung disease and healthcare providers do not measure exacerbations of interstitial lung disease in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the YutrepiaTM label does not constitute an affirmative instruction to measure exacerbations of interstitial lung disease or to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

5. Liquidia will establish that there is no and will be no direct infringement of dependent claims 7-8 of the '327 patent which requires a measurement of clinical worsening events. For example, there is nothing in the YutrepiaTM label that instructs the measurement of clinical worsening events and healthcare providers do not measure clinical worsening events, aggregate the data from multiple patients, and perform statistical analyses in their ordinary course of treating PH-ILD patients. Additionally, healthcare providers would not be able to measure a reduction in clinical worsening in their ordinary course of treating PH-ILD patients because there is no control group with which they can draw comparisons. Any mention of the INCREASE study in the YutrepiaTM label does not constitute an affirmative instruction to measure clinical worsening events or to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

6. Liquidia will establish that there is no and will be no direct infringement of dependent claims 9-10 of the '327 patent which requires a measurement of FVC. For example, there is nothing in the YutreplaTM label that instructs the measurement of FVC and healthcare providers do not measure FVC in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the YutreplaTM label does not constitute an affirmative instruction to measure FVC or to refer to any publication regarding the INCREASE study. Moreover, the Yutrepla label does not in any way incorporate publications related to the INCREASE study.

B. No Induced Infringement

7. Liquidia will establish that it does not and will not induce infringement of any of claims 1-11 and 14-19 of the '327 patent (collectively the "'327 patent Asserted Claims"), including under 35 U.S.C § 271(b), because it lacks the specific intent to instruct or encourage any third party, including patients and healthcare providers, to practice the claimed methods of the '327 patent Asserted Claims. For example, Liquidia's proposed label for YutreplaTM does not reflect Liquidia's specific intent to induce patent infringement by another because the label is directed to a method of treatment that was already in the public domain prior to the filing of the '327 patent—healthcare providers had already been using inhaled treprostinil to treat PH-ILD patients and this use was published in scientific articles. For example, the method of treatment described by the YutreplaTM label was already publicly disclosed in the article authored by Mariana Faria-Urbina et al. titled "Inhaled Treprostinil in Pulmonary Hypertension Associated with Lung Disease" published in 2018 on pages 139–146 in volume 196 of the journal *Lung* ("Faria-Urbina 2018").

8. Liquidia will establish that it does not and will not induce infringement of dependent claims 2, 4, 6-10 of the '327 patent, which all require measuring and calculating "statistically significant" change in the following treatment effects: increase in 6MWD, reduction

in NT-proBNP plasma concentration, reduction in exacerbations of the interstitial lung disease, reduction in clinical worsening events, or increase in FVC. For example, the Yutreptia™ label does not provide any instruction or encouragement to measure or calculate statistically significant changes in these treatment effects. A healthcare provider would also not actively aggregate patient data nor calculate statistical significance in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the Yutreptia™ label does not constitute an affirmative instruction to measure or calculate the statistical significance of changes in those treatment effects, nor does it constitute an instruction to refer to any publication regarding the INCREASE study. Moreover, the Yutreptia label does not in any way incorporate publications related to the INCREASE study.

9. Liquidia will establish that it does not and will not induce infringement of dependent claims 2-3, 8, 17-19 of the '327 patent, which all require a measurement of 6MWD. For example, the Yutreptia™ label does not provide any instruction or encouragement to measure 6MWD. A healthcare provider would also not actively measure 6MWD in their ordinary course of treating PH-ILD patients. Any mention of improvements in 6MWD in the Yutreptia™ label are in the context of the TRIUMPH and INCREASE trials, which did not involve any administration of Yutreptia™. Any mention of the INCREASE study in the Yutreptia™ label does not constitute an affirmative instruction to measure 6MWD, nor does it constitute an instruction to refer to any other publication regarding the INCREASE study. Moreover, the Yutreptia label does not in any way incorporate publications related to the INCREASE study.

10. Liquidia will establish that it does not and will not induce infringement of dependent claims 4-5 of the '327 patent which all require a measurement of plasma concentration of NT-proBNP. For example, the Yutreptia™ label does not provide any instruction or

encouragement to measure plasma concentration of NT-proBNP. In fact, the Yutrepia™ label makes no mention whatsoever of NT-proBNP. A healthcare provider would also not actively measure plasma concentration of NT-proBNP in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the Yutrepia™ label does not constitute an affirmative instruction to measure plasma concentration of NT-proBNP, nor does it constitute an instruction to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

11. Liquidia will establish that it does not and will not induce infringement of dependent claim 6 of the '327 patent which requires measuring exacerbations of interstitial lung disease. For example, the Yutrepia™ label does not provide any instruction or encouragement to measure exacerbations of interstitial lung disease. In fact, the Yutrepia™ label makes no mention whatsoever of exacerbations of interstitial lung disease. A healthcare provider would also not actively measure exacerbations of interstitial lung disease in their ordinary course of treating PH-ILD patients, and in fact would not be able to determine if there are any reductions in exacerbations of interstitial lung disease because there would be no control group outside the clinical trial setting. Any mention of the INCREASE study in the Yutrepia™ label does not constitute an affirmative instruction to measure exacerbations of interstitial lung disease, nor does it constitute an instruction to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

12. Liquidia will establish that it does not and will not induce infringement of dependent claims 7-8 of the '327 patent which requires measuring a reduction in clinical worsening events due to interstitial lung disease. The Yutrepia™ label discusses clinical worsening events as related to a cardiopulmonary indication or arising from PH-ILD generally, rather than ILD

specifically. Because PH-ILD and ILD are distinct diseases and many ILD patients never develop PH-ILD, the Yutrepia™ label cannot instruct or encourage monitoring for clinical worsening events due to ILD. The Yutrepia™ label does not provide any express instruction or encouragement to measure clinical worsening events due to ILD. A healthcare provider would also not actively measure clinical worsening events due to ILD in their ordinary course of treating PH-ILD patients, and in fact would not be able to determine if there are any reductions in clinical worsening events due to ILD because there would be no control group outside the clinical trial setting. Any mention of the INCREASE study in the Yutrepia™ label does not constitute an affirmative instruction to measure clinical worsening events due to ILD, nor does it constitute an instruction to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

13. Liquidia will establish that it does not and will not induce infringement of dependent claims 9-10 of the '327 patent which requires measuring FVC. For example, the Yutrepia™ label does not provide any instruction or encouragement to measure FVC. In fact, the Yutrepia™ label makes no mention whatsoever of FVC. A healthcare provider would also not actively measure FVC in their ordinary course of treating PH-ILD patients. Any mention of the INCREASE study in the Yutrepia™ label does not constitute an affirmative instruction to measure FVC, nor does it constitute an instruction to refer to any publication regarding the INCREASE study. Moreover, the Yutrepia label does not in any way incorporate publications related to the INCREASE study.

14. Liquidia will establish that Liquidia's marketing materials do not demonstrate Liquidia's intent to induce dependent claims 4-10 of the '327 patent. None of Liquidia's marketing materials instruct healthcare providers to perform the steps of dependent claims 4-10. Liquidia's

marketing materials are directed to payors and hospital pharmacies, not healthcare providers. Any mention of the INCREASE study in Liquidia's marketing materials does not constitute an affirmative instruction to perform the steps of dependent claims 4-10, nor does it constitute an instruction to refer to any publication regarding the INCREASE study. Moreover, the Yutrepla label does not in any way incorporate publications related to the INCREASE study.

C. No Infringement Under Doctrine of Equivalents

15. Liquidia will establish that there is no and will be no infringement of the '327 patent Asserted Claims under the Doctrine of Equivalents. UTC presents no analysis that shows that Yutrepla™ will perform substantially the same function in the same way to achieve the same results as any of the '327 patent Asserted Claims. Any statements made in Liquidia's NDA submitted to the FDA or Liquidia's public statements made in business conferences merely establish that blood levels of treprostinil administered via Yutrepla™ were comparable to blood levels of treprostinil administered via Tyvaso®, and does not demonstrate an insubstantial difference between an element of the accused product or process and claim elements or for a determination that Yutrepla™ will perform substantially the same function in the same way to achieve the same results as any of the '327 patent Asserted Claims.

D. No Infringement By Conducting The ASCENT Study

16. Liquidia will establish that there is no and will be no direct or induced infringement of the '327 patent Asserted Claims by conducting the ASCENT study. The ASCENT study does not infringe the '327 patent Asserted Claims because it is reasonably related to the development and submission of information to the FDA, and thus is protected by the safe harbor. Additionally, Liquidia cannot be a direct infringer because Liquidia itself does not perform any step of the '327 patent Asserted Claims with respect to the ASCENT study. Any infringement argument offered

by UTC relies on the ASCENT study protocol and not actual data from the study, and thus cannot establish infringement of the '327 patent Asserted Claims.

II. INVALIDITY

17. Liquidia will prove that it is entitled to a judgment that the '327 patent Asserted Claims are invalid.

A. Priority

18. Liquidia will establish that the '327 patent is not entitled to claim priority to U.S. Provisional Application No. 63/011,810, filed April 17, 2020, because the '810 provisional does not provide adequate written description support for the '327 patent Asserted Claims.

B. Anticipation

19. To the extent the Asserted Claims are not entitled to the April 17, 2020 priority date of the '810 application, Liquidia will prove by clear and convincing evidence that claims 1-8, 11, and 15-19 of the '327 patent are invalid as anticipated under 35 U.S.C. § 102(a) because the claimed method of treating pulmonary hypertension associated with interstitial lung disease (“PH-ILD”) was fully described by UTC’s Press Release entitled “United Therapeutics Announces INCREASE Study of Tyvaso® Meets Primary and All Secondary Endpoints,” which was published on February 24, 2020 (“Feb. 2020 Press Release”).

20. Liquidia will prove by clear and convincing evidence that claims 1-11, 15-19 of the '327 patent are invalid as anticipated under 35 U.S.C. § 102(a), either literally or inherently, because the claimed method of treating PH-ILD was fully described by Faria-Urbina 2018. Liquidia will also prove by clear and convincing evidence that claims 1-11 and 15-19 of the '327 patent are invalid as inherently anticipated under 35 U.S.C. § 102(a) because Faria-Urbina 2018 fully described the claimed dosing and method of treating PH-ILD, which was the same dosing

and method used in the INCREASE study, a clinical study for inhaled treprostinil in PH-ILD patients.

21. Liquidia will also prove by clear and convincing evidence that the '327 patent Asserted Claims are invalid as inherently anticipated under 35 U.S.C. § 102(a) because the 2009 Tyvaso® Label fully described the claimed dosing and method of treating PH-ILD.

22. Liquidia will also prove by clear and convincing evidence that the '327 patent Asserted Claims are invalid as inherently anticipated under 35 U.S.C. § 102(a) because the 2017 INCREASE Study Description, a public disclosure of the INCREASE Study (NCT02630316) available online at clincialtrials.gov, fully described the claimed dosing and method of treating PH-ILD.

23. Liquidia will also prove by clear and convincing evidence that the '327 patent Asserted Claims are invalid as inherently anticipated under 35 U.S.C. § 102(a) because the abstract by Manyoo Agarwal et al. titled “Inhaled Treprostinil in Group-3 Pulmonary Hypertension” that was published in April 2015 and presented at the International Society for Heart and Lung Transplantation 35th Annual Meeting and Scientific Sessions (“Agarwal 2015”) fully described the claimed method of treating PH-ILD, which was the same as the method used in the INCREASE study.

C. Prior Public Use

24. Liquidia will also prove by clear and convincing evidence that claims 1-11, 15-19 of the '327 patent are invalid under 35 U.S.C. § 102(a) for prior public use because the method of treatment claimed by the '327 patent was widely and publicly used prior to April 17, 2019, and was ready for patenting. The method of treatment was publicly used and publicly accessible prior to April 17, 2019 by at least Drs. Aaron Waxman, Nicholas Hill, Rajan Saggar, Rajeev Saggar,

Victor Tapson, and Richard Channick who independently came up with the method of treatment. Dr. Kishan Parikh also confirmed that his colleagues at the Duke University Medical Center prescribed inhaled treprostinil to treat PH-ILD patients from 2013 to 2018. Those doctors' public use of the method of treatment claimed by the '327 patent is reflected in their publications such as Agarwal 2015, Faria-Urbina 2018, and Parikh 2016. This use of the claimed method of treatment would have been accessible to the public because the patients, nursing staff, medical insurance providers, and other doctors would have been informed of the use of inhaled treprostinil to treat PH-ILD patients without any expectation or understanding to keep such information confidential. The public nature of the doctors' use of the method of treatment claimed by the '327 patent is further supported by public statements made by UTC's CEO, Dr. Martine Rothblatt, to investors in 2018 where she boasted that Tyvaso® "works" in PH-ILD, that "through the kindness and generosity of certain payers around the country who have gone ahead and upon the initiative of their physicians, were able to enable some WHO Group III patients to benefit [from Tyvaso®]", and that "[e]very patient is carefully assessed by payers in ensuring that it's an appropriate patient and that they're obligated to pay for and not an experimental patient". This public use would have disclosed all limitations in claims 1-11, 15-19 of the '327 patent. The publicly used invention would have been ready for patenting and reduced to practice because the physicians above actually observed improvements in exercise capacity, plasma NT-proBNP levels, and other quality of life measurements following treatment with inhaled treprostinil according to the dosing regimen of the '327 patent. This public use was also not experimental because, among other reasons, it involved a commercial transaction, was not controlled by UTC, and did not involve any expectation of confidentiality. The treatment of PH-ILD patients with severe or out-of-proportion

PH is still considered treating PH-ILD patients and thus falls within the scope of claim 1 of the '327 patent.

D. Prior Public Sale

25. Liquidia will also prove by clear and convincing evidence that claims 1-11, 15-19 of the '327 patent are invalid under 35 U.S.C. § 102(a) for prior public sale because the method of treatment claimed by the '327 patent was the subject of a commercial sale before the critical date of the '327 patent, April 17, 2019, and was ready for patenting. The prior public use by doctors of the method of treatment claimed by the '327 patent, discussed above in ¶24, is also evidence that Tyvaso® was offered for sale and actually sold to treat PH-ILD patients prior to April 17, 2019. Such prior sale is also supported by public statements made by UTC's CEO, Dr. Martine Rothblatt, to investors in 2018 that "through the kindness and generosity of certain payers around the country who have gone ahead and upon the initiative of their physicians, were able to enable some WHO Group III patients to benefit [from Tyvaso®]" and that "[e]very patient is carefully assessed by payers in ensuring that it's an appropriate patient and that they're obligated to pay for and not an experimental patient". UTC was aware of this off-label sale as also evidenced by data from the Federal Adverse Event Report System (FAERS). This prior sale would have also disclosed all limitations in claims 1-11, 15-19 of the '327 patent. The sale of Tyvaso® to treat PH-ILD patients with severe or out-of-proportion PH is would still fall within the scope of claim 1 of the '327 patent.

E. Obviousness

26. Liquidia will prove by clear and convincing evidence that the '327 patent Asserted Claims are invalid under 35 U.S.C. § 103 because they would have been obvious as of the earliest effective filing date(s) in view of the scope and content of the prior art, the differences between

the '327 patent Asserted Claims and the prior art, and the level of ordinary skill at the relevant time.

27. With respect to claims 1-3, 6-8, 11, and 14-19 of the '327 patent, Liquidia will establish that a person of ordinary skill in the art would have been motivated to combine Faria-Urbina 2018 with the '793 patent in view of his or her knowledge and background, and had a reasonable expectation of success in developing the claimed method of treating PH-ILD of claims 1-3, 6-8, 11, and 14-19 of the '327 patent based upon such information.

28. With respect to claims 4-6, 9-10 of the '327 patent, Liquidia will establish that a person of ordinary skill in the art would have been motivated to combine the article authored by Rajeev Saggar et al. titled "Changes in right heart haemodynamics and echocardiographic function in an advanced phenotype of pulmonary hypertension and right heart dysfunction associated with pulmonary fibrosis," published on pages 123–129 of volume 69 of *Thorax* in 2014 ("Saggar 2014") with Faria-Urbina 2018 and the '793 patent in view of his or her knowledge and background, and had a reasonable expectation of success in developing the claimed method of treating PH-ILD of claims 4-5 of the '327 patent based upon such information.

29. With respect to claims 1-3, 6-8, 11, and 14-19 of the '327 patent, Liquidia will establish that a person of ordinary skill in the art would have been motivated to combine Agarwal 2015 with the '793 patent in view of his or her knowledge and background, and had a reasonable expectation of success in developing the claimed method of treating PH-ILD of claims 1-3, 6-8, 11, and 14-19 of the '327 patent based upon such information.

30. With respect to claims 4-6, 9-10 of the '327 patent, Liquidia will establish that a person of ordinary skill in the art would have been motivated to combine Saggar 2014 with Agarwal 2015 and the '793 patent in view of his or her knowledge and background, and had a

reasonable expectation of success in developing the claimed method of treating PH-ILD of claims 4-5 of the '327 patent based upon such information.

31. With respect to claims 9-10 of the '327 patent, and to the extent the Court find the '327 patent is not entitled to the April 17, 2020 filing date of the '810 provisional, Liquidia will establish that a person of ordinary skill in the art would have been motivated to combine the Feb. 2020 Press Release with Saggars 2014 in view of his or her knowledge and background, and had a reasonable expectation of success in developing the claimed method of treating PH-ILD of claims 9-10 of the '327 patent based upon such information.

32. With respect to claim 14 of the '327 patent, and to the extent the Court find the '327 patent is not entitled to the April 17, 2020 filing date of the '810 provisional, Liquidia will establish that a person of ordinary skill in the art would have been motivated to combine the Feb. 2020 Press Release with the '793 patent, titled "Treprostинil Administration by Inhalation," in view of his or her knowledge and background, and had a reasonable expectation of success in developing the claimed method of treating PH-ILD of claim 14 of the '327 patent based upon such information.

33. UTC bears the burden to show the existence of any alleged objective indicia of non-obviousness (e.g., unexpected results, long-felt but unmet need) sufficient to overcome Liquidia's *prima facie* case of obviousness. Liquidia will introduce evidence to rebut any evidence introduced by UTC regarding any alleged objective indicia of non-obviousness and any requisite nexus with the claimed subject matter of the '327 patent Asserted Claims. Additionally, any evidence of independently made, simultaneous inventions, made within a comparatively short period of time, is persuasive evidence that the claimed invention was the product of only ordinary skill. Here, as discussed in ¶¶24 and 35, multiple doctors independently developed and publicly used the method of treatment claimed by the '327 patent. Liquidia will establish that any alleged

secondary considerations asserted by UTC do not weigh in favor of non-obviousness of any of the '327 patent Asserted Claims.

F. Intended Results

34. To the extent UTC argues, and the Court agrees, that the elements in the dependent claims are directed to an intended result of performing the steps of claim 1, as UTC's experts have opined, then Liquidia will establish that claims 2-10 and 17-19 of the '327 patent are merely directed to an intended result of the method of treatment in independent claim 1, and that they are thus non-limiting and have no patentable weight such that they cannot be used to distinguish the prior art. Additionally, UTC's expert witness Dr. Stephen Nathan testified that "any prescription by a doctor of inhaled treprostinil at the claimed dosing range to a PH-ILD patient will infringe all of the asserted claims, irrespective of whether the patient actually achieved the intended treatment result of those claims," indicating that although the parties agreed that the preamble of claim 1 has patentable weight, Dr. Nathan has taken a different view and accordingly, the preamble of claim 1 is non-limiting and has no patentable weight. To the extent the Court adopts UTC's construction that claims 2-10 and 17-19 of the '327 patent require no additional active steps and are merely directed to an intended result of claim 1, Liquidia only needs to prove the invalidity of claim 1 of the '327 patent to render claims 2-10 and 17-19 also invalid.

G. Improper Inventorship

35. Liquidia will also prove by clear and convincing evidence that claims 1-11, 15-19 of the '327 patent are invalid for improper inventorship. As evidenced by at least UTC's internal emails, presentations, witness testimony, and as reflected in the Agarwal 2015 and Faria-Urbina 2018 publications, at least Dr. Aaron Waxman, among other doctors, independently conceived of and reduced to practice at least claim 1 of the '327 patent well before the filing date of the '327

patent. Dr. Waxman's conception of the claimed invention was sufficiently definite and permanent because he actually observed improvements in at least exercise capacity following treatment with inhaled treprostinil according to the dosing regimen claimed by the '327 patent. Dr. Waxman's conception for the purposes of inventorship did not require proving the efficacy and safety of the claimed method through a randomized clinical trial—conception and reduction to practice was already complete at least when Dr. Waxman publicly treated PH-ILD patients with inhaled treprostinil and saw the aforementioned improvements. This is supported by the fact that the dosing regimen disclosed by the 2009 Tyvaso label, which is the same as that claimed by the '327 patent, did not change even after a randomized clinical trial for inhaled treprostinil in PH-ILD patients, the INCREASE study. The named inventors of the '327 patent, Leigh Peterson, Chunqin Deng, and Peter Smith, merely carried out the INCREASE trial and confirmed that Dr. Waxman's method of treatment was safe and efficacious for the purposes of FDA approval.

H. Written Description

36. Liquidia will prove by clear and convincing evidence that claims 9-10 of the '327 patent are invalid under 35 U.S.C. § 112(a) for lack of written description. More specifically, claim 9 of the '327 patent requires “a statistically significant improve[ment] of forced vital capacity (FVC) in the patient after 8 weeks, 12 weeks, or 16 weeks of the administering.” Claim 10 of the '327 patent, which depends on claim 9, requires an “improve[ment] [of] forced vital capacity (FVC) in the patient by at least 20 ml after 8 weeks, 12 weeks, or 16 weeks of the administering.” A person of ordinary skill in the art reading these claims in view of the specification would understand that the PH-ILD patient being treated would encompass multiple different subpopulations, including (but not limited to): idiopathic pulmonary fibrosis (“IPF”), idiopathic interstitial pneumonia (“IIP”), combined pulmonary fibrosis and emphysema (“CPFE”),

and connective tissue disease (“CTD”). A person of ordinary skill in the art reading these claims in view of the specification would also understand that FVC in claim 9 encompasses both absolute FVC (expressed in mL) and percent predicted FVC. Demonstrating that the inventors were in possession of the full scope of the claimed invention would thus require a showing of statistically significant improvements in both absolute FVC and percent predicted FVC, in the different subpopulations of PH-ILD, including (but not limited to) IPF, IIP, CPFE, and CTD. A lack of statistically significant improvements in either absolute FVC or percent predicted FVC would signal to a person of ordinary skill in the art that the inventors did not possess the full scope of ’327 patent. A person of ordinary skill in the art would not simply disregard inoperable embodiments in the ’327 patent specification. Here, the ’327 patent specification does not provide data supporting the full scope of claims 9 and 10, particularly data showing that the full scope of the claimed PH-ILD population experienced statistically significant improvements in FVC following administration of inhaled treprostinil and data showing the full scope of the claimed absolute and percent predicted FVC improved by a statistically significant amount. Thus, the specification of the ’327 patent does not convey to a person of ordinary skill in the art that the inventors were in possession of the full scope of the claimed invention(s) as of the filing date.

III. UNENFORCEABILITY

A. Inequitable Conduct

37. Liquidia will prove by clear and convincing evidence that the ’327 patent Asserted Claims are unenforceable due to the inequitable conduct of Messrs. Shaun Snader and Stephen Maebius. Although both attorneys owed a duty of disclosure to the USPTO to disclose information material to the prosecution of the ’327 patent, they did not disclose certain but-for material references including (1) submissions in the ’793 patent IPR proceedings including UTC’s Patent

Owner Response, Waxman Declaration, and Final Written Decision, (2) the '793 Patent District Court Opinion, (3) Dr. Nicholas Hill's trial testimony in the '793 Patent District Court case, and (4) the Federal Circuit's affirmance of the '793 Patent District Court Opinion (including the Court's claim construction). These undisclosed references were not cumulative of references already in front of the patent examiner and would have caused the PTO to reject the '327 patent application. As a specific example, UTC's Patent Owner Response in the '793 patent IPR proceedings would have informed the examiner that the '793 patent, which Dr. Stephen Nathan admits facially does not disclose treating PH-ILD patients with inhaled treprostinil, actually covers the same subject matter as that of the '327 patent.

38. Liquidia will prove by clear and convincing evidence that Messrs. Snader's and Maebius's failure to disclose material information was done with a specific intent to deceive the PTO. During the prosecution of the '327 patent, Messrs. Snader and Maebius were aware of certain but-for material references including submissions in the '793 patent IPR proceedings such as UTC's Patent Owner Response, Waxman Declaration, and Final Written Decision as well as documents from the prior district court litigation between the parties making clear the scope of the claims of the '793 patent. During prosecution of the '327 patent, Mr. Maebius and Mr. Snader knew that the '793 patent was in an IPR and had in fact been rendered unpatentable by the PTAB. They also knew that the claims of the '793 patent were the only claims at the time that covered the new PH-ILD indication UTC obtained for the Tyvaso label. And in fact, they knew UTC asserted the '793 patent against Liquidia based only on Liquidia's addition of the PH-ILD indication in the Yutrepia label. Thus, Messrs. Maebius and Snader knew that the only patent covering the PH-ILD indication was invalid and had motivation to obtain a new patent covering PH-ILD. Messrs. Maebius and Snader, knew or should have known that bringing the '793 patent to the specific

attention of the Examiner, coupled with their arguments in the '793 IPR that the '793 patent satisfied a long-felt need because the claims are directed to improving exercise capacity as well as the district court documents confirming the scope of the '793 patent claims, would have resulted in further anticipatory, obviousness and double patenting rejections. Being intimately involved in the '793 patent IPR and district court litigation and the arguments submitted therein, and with knowledge of the amendments made to the pending '327 patent claims, the most reasonable inference to be drawn is that Messrs. Maebius and Snader intentionally withheld the arguments made concerning the scope of the '793 patent claims during the '793 patent IPR with an intent to deceive the PTO and obtain allowance of the '327 patent.

IV. REMEDIES

39. Liquidia requests the following relief:

- a. A judgment declaring that all asserted claims of the '327 patent are not infringed;
- b. A judgment declaring that all asserted claims of the '327 patent are invalid and/or unenforceable;
- c. A judgment declaring that Liquidia's Product will not directly, indirectly or under the Doctrine of Equivalents infringe any valid and enforceable claim of the and '327 patent under any subsection of 35 U.S.C. § 271, and is not now directly, indirectly or under the Doctrine of Equivalents infringing, any valid and enforceable claim of the '327 patent under any subsection of 35 U.S.C. § 271;
- d. An order enjoining UTC, their officers, agents, servant, employees, attorneys, and representatives and any successors and assigns thereof, from

charging or asserting infringement of any claim of the '327 patent against Liquidia, or anyone in privity with Liquidia;

- e. A judgment declaring that this case stands out from others and as such is an exceptional case pursuant to 35 U.S.C. § 285 and ordering UTC to pay Liquidia's costs and reasonable attorneys' fees incurred in this action;
- f. An award of costs and expense in this action to Liquidia;
- g. Such further and other relief as the Court deems just and proper.